OUR EXPERTS' FAVORITE JIGS: EASY SHOP ADD-ONS! (p. 46)

WOODWORKER'S JOURNAL

"America's leading woodworking authority"™

40 YEARS

Family-made Adirondack Chair

DAD AND DAUGHTER CREATE MEMORIES IN THE SHOP Page 56

SCROLL SAW FLOWER BOX: GREAT GIFT FOR MOTHER'S DAY
Page 32

June 2016

$6.99

7 33175 50212 2

Display until July 4, 2016

WANT STUNNING, CUSTOMIZED DOORS WITH STRONG JOINTS?

Use Freud's Door Making Solutions with PATENTED EXTENDED TENONS!

With Freud's one-of-a-kind patented extended tenon system, you are able to build truly customized doors with rock-solid joints that will last a lifetime.

French Door Bit Sets

Available in 3 Popular Profiles

Item #98-318

Premier Adjustable Rail & Stile Bits

Available in 5 Popular Profiles

Item #99-762

Entry & Interior Door Sets

Available in 3 Popular Profiles

Item #98-302

UNLEASH YOUR CREATIVITY WITH freud®

For more information visit: **www.Rockler.com/Freud**

Check out our prices on these popular saw blades.

Qsaw® 201 blades are precision milled using the latest CNC technology, resulting in faster and better cutting, making them the choice of commercial and professional users alike.

Q201® Premium Band Saw Blades – 72"x½" (6'0"x½")
72" length for Shopsmith or similar models, hard edge, Hard Back Carbon
only $12.57ea

Q201® Band Saw Blades – 93½"x½" (7'9½"x½")
Hard Back Carbon, fits most 14" Delta Jet, etc.
only $15.11ea

Q201® Band Saw Blades – 105"x½" (8'9"x½")
Hard Back Carbon, fits most 14" band saws with risers
only $16.38ea

Q201® Band Saw Blades – 80"x½" (6'8"x½")
hard edge, flex back, Hard Back Carbon, for Sears Craftsman 12-inch models
only $13.84ea

Q201® Custom Band Saw Blades
- Manufactured with precision ground tooth
- Computer controlled hardening
- Custom welded to any length
- Shipped in 24 hours

Ideal for the woodworking industry, our custom welded blades feature spring-tempered backs and precisely hardened teeth allowing for very accurate cuts.

SAWBLADE•COM®
RUN LEAN

800.754.6920

Woodworker's Journal

Contents

June 2016 Volume 40, Number 3

Projects

Compound Cut Flower Box Page 32

By Carole Rothman

Details like a round lid liner with the same grain on all edges, contoured petals and a stack-cut butterfly add elegance to this box.

Family-made Adirondack Chair

By Chris Marshall

Our senior editor and his daughter build a simple chair that's the perfect place for outdoor relaxing.

Page 56

Oar Chair

By Peter Marcucci

An upcycled oar becomes an evocative chair that also features a sculpted seat and joinery inspired by Sam Maloof.

Page 26

Page 38

Two Go-to Jigs

By Don Phillips and Hendrik Varju

These two jigs solve real woodworking problems — increasing accuracy and safety.

Page 41

Corbels & Brackets

Appliques & Onlays

THE NEW BENDIX by OSBORNE

Offering Quality Products & Exceptional Customer Service

Moldings & Accents

Order Online or By Phone

www.classicisland.com 1-855-885-9454

Order Online or By Phone: www.classicisland.com 1-855-885-9454

Departments

woodworkersjournal.com

If you think the only things you'll find on social media are political rants and people bragging about their amazing pets, kids and food — um, you're mostly right. But if you haven't checked them out yet, the Woodworker's Journal social media channels, including Facebook, YouTube, Pinterest, Twitter, and Instagram, feature great woodworking videos, tips, articles and projects every day. Thousands of your fellow woodworkers are already there, asking and answering questions and posting pictures of their projects (and maybe a few of their dogs, too). We even give away prizes once in a while!

So we encourage you to give the Woodworker's Journal social media channels a try. We think you'll "Like" what you find. Who knows, you might even find yourself compelled to share pictures of your latest projects.

You can find us by visiting any of the social media channels mentioned and entering "Woodworker's Journal" in their search box. Or click on the icons on the *woodworkersjournal.com* homepage to go directly to our social media pages.

— Dan Cary

Try it, you might Like it!

RIKON

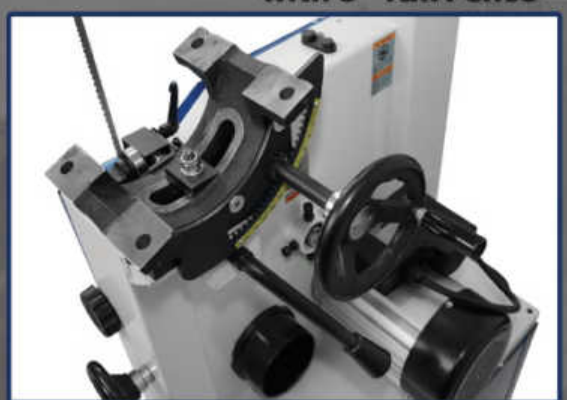
5 YEAR WARRANTY

COMING IN APRIL

NEW Innovative Technology

NEW Spring Loaded Tool-Less Guide System*

NEW Quick Adjust Fence System with 6" Tall Fence*



NEW Quick Lock Trunnion System*

*PATENT PENDING

NEW 14" Deluxe Bandsaw

10-326

MSRP: $999.99

For More Information Visit:
www.rikontools.com
Today!

Letters

When the Cord Was Cut

I SAW IT AND KNEW I NEEDED ONE RIGHT NOW!

The cabinet shop next door was full of nice guys, but crummy tools. The shop I worked in had some really top-drawer equipment. I actually felt a bit bad for those guys, and then it happened. I walked into our building and looked into the other shop and they were all standing around looking at a new drill the owner was holding. It was blue and awkward looking. The handle was long and skinny and, well — weird. And then it struck me — there was no cord on that drill. Whoa!

That Makita (Model 6093 I believe) was the first cordless drill I'd seen. And I wanted it as soon as I held it in my hands. The foreman at my shop said they were "toys" and wouldn't hold up. Not to be restrained, I made a beeline to 7 Corners Ace Hardware, the Twin Cities go-to store for power tools. I saw one on the shelf, saw its price ... and then reality set in. I can't remember the actual cost of the tool at that time, but I do remember formulating arguments to convince my wife that the pricey purchase would be worth it. Sadly, even to my tool-deluded mind they sounded wimpy and dumb. So I never did buy that drill.

Cordless drills have come a long way since the 1980s. (I now own an embarrassing number of them.) They've become ubiquitous and ever more durable and powerful. In our *Reader's Survey* this issue (page 24) we present the results of a survey about those shop stalwarts and ask you questions about how you use them (and maybe even mis-use them). The results may surprise — and surely entertain — you!

— Rob Johnstone

Laser Vision

I just received the February 2016 issue and enjoyed the "High-Tech Party Puzzle Tray" article. In a sidebar, the LASER acronym is explained to stand for "Light Amplified by Stimulation of Radiation." The "E" is missing. This is because the explanation is close, but not quite right. The actual acronym is "Light Amplification by Stimulated Emission of Radiation." Einstein explained how light could stimulate the emission of more, identical light, and that is what made lasers possible.

An engineering professor and woodworker enjoys our technology articles.

For those of us who have a passion for making both sawdust and photons, articles like this are doubly pleasurable. Keep up the great work!

Dr. Robert R. McLeod
Electrical, Computer and Energy Engineering Department
University of Colorado at Boulder

Continues on page 10 ...

ROCKLER PRESS
THE VOICE OF THE WOODWORKING COMMUNITY

JUNE 2016
Volume 40, Number 3

ROB JOHNSTONE *Publisher*
ALYSSA TAUER *Associate Publisher*
JOANNA WERCH TAKES *Editor*
CHRIS MARSHALL *Senior Editor*
JEFF JACOBSON *Senior Art Director*
JOE FAHEY *Associate Art Director*
DAN CARY *Senior Web Producer*
MATTHEW HOCKING *Internet Production Coordinator*
MARY TZIMOKAS *Circulation Director*
LAURA WHITE *Fulfillment Manager*

Founder and Chairman
ANN ROCKLER JACKSON

Publisher Emeritus
LARRY N. STOIAKEN

Contributing Editors
NORTON ROCKLER
SANDOR NAGYSZALANCZY
ERNIE CONOVER

Advertising Sales
DAVID BECKLER *National Sales Representative*
dbeckler@woodworkersjournal.com
(469) 766-8842 Fax (763) 478-8396

Editorial Inquiries
JOANNA WERCH TAKES
jtakes@woodworkersjournal.com

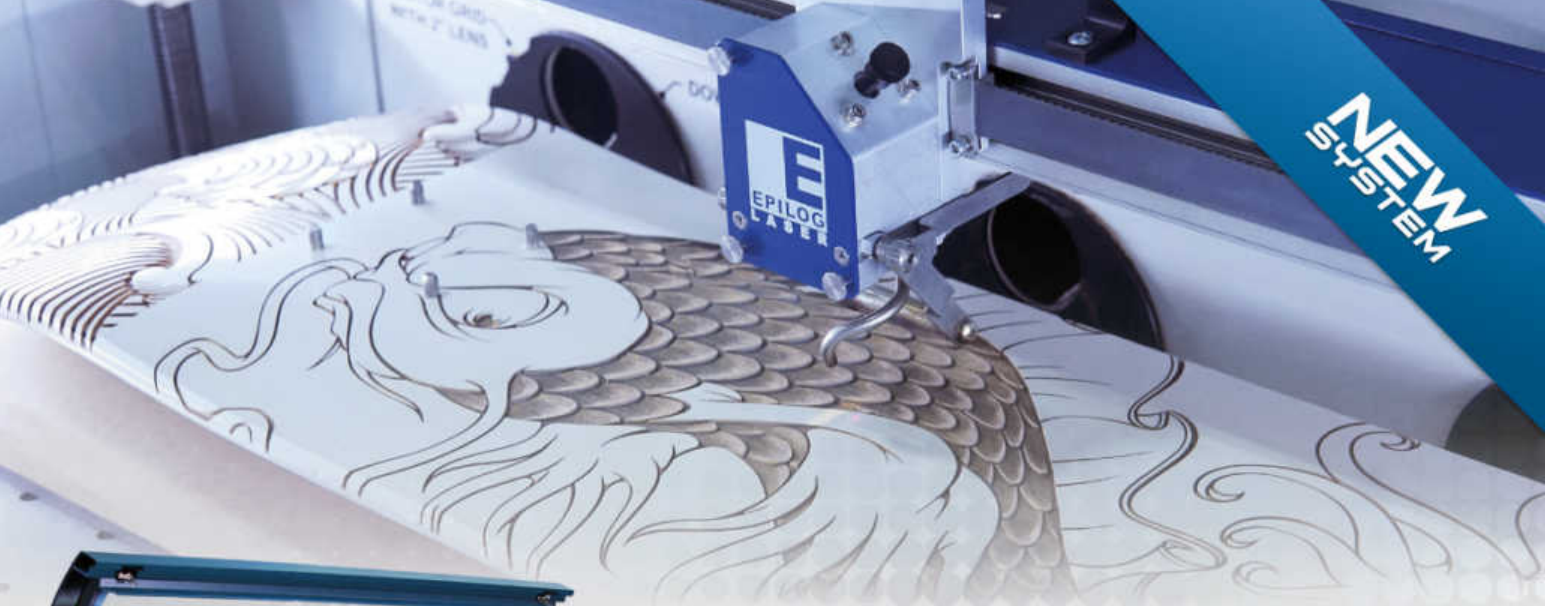
Subscription Inquiries
(800) 765-4119 or
www.woodworkersjournal.com
Write Woodworker's Journal, P.O. Box 6211, Harlan, IA 51593-1711
email: *WWJcustserv@cdsfulfillment.com.* Include mailing label for renewals and address changes. For gift subscriptions, include your name and address and your gift recipient's.

Book Sales and Back Issues
Call: (800) 610-0883
www.woodworkersjournal.com

Other Questions or Problems
Call: 763-478-8255
rjohnstone@woodworkersjournal.com

Woodworker's Journal (ISSN: 0199-1892), is published in February, April, June, August, October and December by Rockler Press Inc., 4365 Willow Dr., Medina, MN 55340. Periodical postage paid at Medina, Minnesota and additional mailing offices. Postmaster: Send all address changes to Woodworker's Journal, P.O. Box 6211, Harlan, IA 51593-1711. Subscription Rates: One-year, $19.95 (U.S.); $28.95 U.S. funds (Canada and other countries). Single copy price, $5.99.

Publications Mail Agreement Number 0861065. Canadian Publication Agreement #40009401.



THE NEW FUSION M2 40

Larger Work Area // Dual Source Laser // eView™ Compatible

CO2 // FIBER
DUAL SOURCE CAPABILITIES

Our latest standard in laser system design:

With its larger size, the Fusion M2 40 allows users to tackle larger projects with the same laser precision and high-quality results Epilog is known for. Add to that dual-source laser capabilities and the possibilities are virtually endless.

With the dual-source Fusion M2 40, operators can complete both CO2 and fiber applications in one system, even within the same job!

Now, no matter what substrate you're working with – wood, metal, plastics – you have a larger-scale system that meets all of your laser engraving and cutting demands.

- 40″ x 28″ engraving area
- Flame-polished edge cuts
- Laser tube wattages up to 120 watts
- Large viewing door with LED lighting
- Our highest engraving and cutting speeds
- Engrave items up to 13.25″ in material height
- Dual source (fiber and CO2) and camera options

Contact Epilog Laser today for a laser system demo!

EPILOG LASER

MADEiNUSA

www.epiloglaser.com/wwj • sales@epiloglaser.com • 888-437-4564

Letters continued

There's more online at woodworkersjournal.com

www.woodworkersjournal.com
MORE ON THE WEB

Check online for more content covering the articles below:

Woodturning (page 20):
Cubic boron nitride grinding wheels for sharpening turning tools (video); link to video on using a bench grinder

Reader's Survey (page 24):
A list of interesting tasks that cordless drill/drivers have been used for ... but are clearly not what the tool was made for

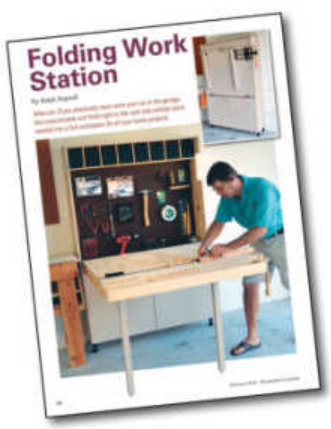
Oar Chair (page 26):
A detailed introduction to double bevel marquetry (video); simple instructions for shop-made marquetry cutting table

Petal Compound Box (page 32):
Using power sanders to contour and shape wood (video)

Today's Shop (page 46):
Using Drawer Pull JIG IT for cabinet hardware installation; using Rockler Thin Rip Tablesaw Jig (videos)

Technology & Woodworking (page 52): *Using woodworking apps (video)*

Weekend Projects (page 56):
Template routing; making wood plugs (videos)



Several readers expressed safety concerns over author Ralph Bagnall's footwear choice in the Folding Work Station article.

Reader Reta Price found our Miter Saw Station plan to be just what she needed for her shop.

Saw Station Success

I finally did it! Following Ralph Bagnall's plans, instructions, and photos, I built my own Miter Saw Station [from the June 2015 issue] with a few modifications for my workshop/garage setup. I used wheels under the cabinets (rather than the leveling legs) and left the miter saw shelf removable so that I could move one of the cabinets if I needed to. This project was a bit of a challenge for this 67-year-old woman, and I am so proud of how it turned out. I read your magazine cover to cover each time it arrives.

Reta Price
Placitas, New Mexico

Sloppy Footwork

I was very surprised at the photos accompanying the article "Folding Work Station" in the February 2016 issue.

Sandals in a workshop? Safety shoes have saved my toes and feet many times.

Patrick Bradley
Spokane, Washington

The February 2016 issue showing Ralph Bagnall working in sandals was ridiculous. Nobody with half a brain would enter, let alone work, in a shop in sandals, flip-flops, or other open footwear. What's next: Bagnall in a Speedo?

Sam Runco
Hanover, Pennsylvania

WJ Responds: The readers who called us to task on these photos were correct; for shop safety, you should wear closed-toe shoes.

Music from His Shop

In the February 2016 issue of Woodworker's Journal, Sandor Nagyszalanczy published his version of an antique music box ["Old-fashioned Music Box"].

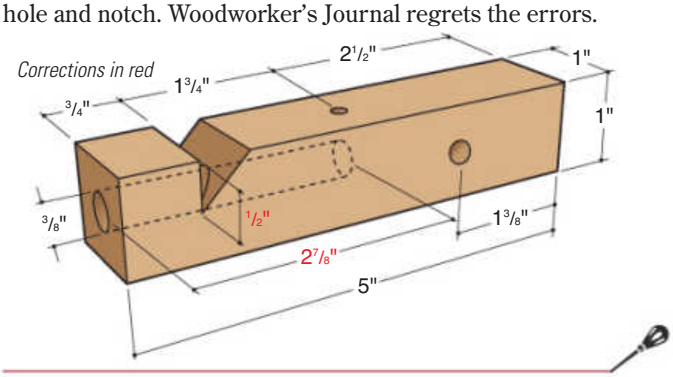
I really liked it, so here's my version: I used VCarve Pro to design the parts, and my Shark CNC to make the components. I built it; my wife programmed it.

Bob Hartig
Sheboygan, Wisconsin

Bob Hartig built the Old-fashioned Music Box, with musical programming by his wife.

Correction

In "Turn a Two-Tone Whistle" in the April 2016 issue, some dimensions were printed incorrectly. To clarify: the fipple is made from a 1¼" length of wood, which includes extra length to adjust the fipple for maximum sound quality. See below for a drawing with correct dimensions for the sound chamber hole and notch. Woodworker's Journal regrets the errors.

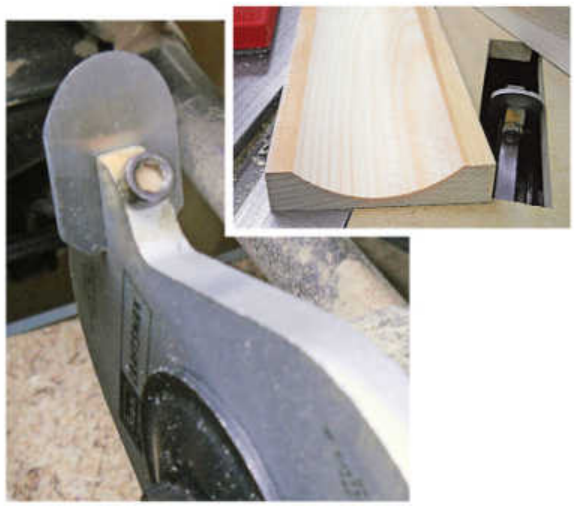


New Crossover Applications for Tools

Lacquer Thinner Rejuvenates Wood Putty

If you have solvent-based wood putty that has sat too long in the can and now is as hard as concrete, all is not lost! Don't throw it away. Instead, add a little lacquer thinner to the can and leave it for a couple of days. It'll soften the putty again. Then mix it up thoroughly, and the putty will work as good as new.

Fred Stark
Neosho, Missouri



Molding Head Cuts Smoother Coves

Milling coves at the table saw is a great way to get large, customized moldings in any species you need. But, if you use a standard saw blade, only the sharp corners of the teeth dig into the wood — and that can leave a ragged surface that takes a lot of sanding to clean up. I use a different cutter: my table saw molding head with three 1" fluted blades. It mills coves much more smoothly, and I estimate that it reduces the final sanding effort by half or even 75 percent. It's definitely the better choice for me!

Serge Duclos
Delson, Quebec

Handy Quilter's Tool Checks Dimensions

My mother-in-law was a quilter, and among her supplies I found this aluminum measuring tool. It's double-sided and has 14 measurements in eighth-inch increments from 1/8" to 2". I find it handy for measuring dadoes, rabbets and thicknesses. These are still sold at sewing stores for just a couple of dollars.

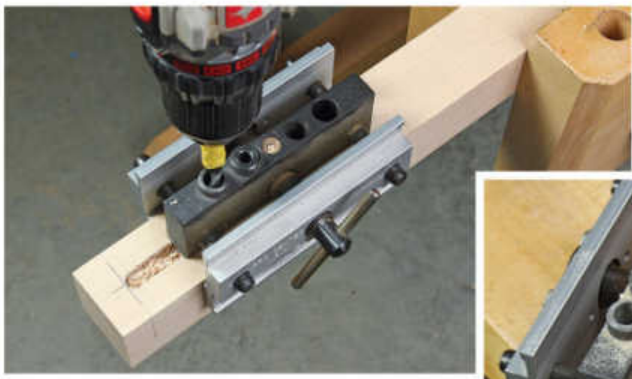
Larry Krajewski
LaCrosse, Wisconsin

Food Scale for Measuring Epoxy Ratios

The problem with epoxy is that if you don't blend exactly the right amounts of resin and hardener, it stays tacky and never reaches full strength. Instead of trying to guess at the volumes, I just use a food scale, set to grams. Use a disposable cup to hold the mixture. Set it on the scale, and be sure to zero the scale out. Now squeeze in, say, 10 grams of hardener. Add resin until you reach 20 grams, and you'll know you have a perfect 50/50 ratio. Of course, the scale will work for any other ratio you need to make as well, if you do the math first.

Doug Thalacker
Mt. Pleasant, Wisconsin

PICK OF THE TRICKS



Doweling Jig Makes Great Mortises, Too

I don't have a mortising machine, and until recently I used my drill press instead. But, in the middle of a mortising job, the motor failed. Then, while considering the options, I reached for my clamp-on doweling jig. Turns out, it works great for the task! Just drill a series of overlapping holes, starting with the mortise ends. Re-clamp the jig for each hole to hog out the mortise. I find the doweling jig makes mortises as well as my drill press did.

Mike Laney
Palm Coast, Florida

Safety First

Learning how to operate power and hand tools is essential for developing safe woodworking practices. For purposes of clarity, necessary guards have been removed from equipment shown in our magazine. We in no way recommend using this equipment without safety guards and urge readers to strictly follow manufacturers' instructions and safety precautions.

TRICKS OF THE TRADE SPONSORED BY TITEBOND

In addition to our standard payment (below), Mike Laney of Palm Coast, Florida, will also receive 12 bottles of Titebond Quick & Thick Glue and a Titebond pullover jacket for being selected as the "Pick of the Tricks" winner. We pay from $100 to $200 for all tricks used. To join in the fun, send us your original, unpublished trick. Please include a photo or drawing if necessary. For your chance to win, submit your Tricks to Woodworker's Journal, Dept. T/T, P.O. Box 261, Medina, MN 55340. Or send us an email: tricks@woodworkersjournal.com

Questions & Answers

How to Move Shop?

THIS ISSUE'S EXPERTS

Chris Marshall is senior editor of *Woodworker's Journal* and author of several woodworking books.

Dr. Jim Randolph, DVM, is a veterinarian practicing in Mississippi who regularly blogs at *mypetsdoctor.com*.

Contact us by writing to "Q&A," Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340, by faxing us at (763) 478-8396 or by emailing us at: *QandA@woodworkersjournal.com* Please include your home address, phone number and email address (if you have one) with your question.

Winner!

For simply sending in his question about moving a wood shop, Greg Glennon of Charlottesville, Virginia, wins a General International 7-piece Deluxe 8" Dado Blade Set (item 55-185). Each issue we toss new questions into a hat and draw a winner.

Q I have been a woodworker since working in my dad's basement workshop on small projects. I started to acquire my own tools and outfitted a 20' x 20' garage workshop over 18 years while I lived in Texas. But now I'm moving to Virginia. Help! I have no idea about the best way to move all of my machinery across the country.

Greg Glennon
Charlottesville, Virginia

A Having moved three times with lots of shop machinery, I know exactly the plight you're in. You have a couple of options. If you are having a moving company relocate you, most will move shop machinery, too. Of course, that weight adds up fast, and they may have dimensional limits for how large each piece of machinery can be, but they WILL move your stuff (for a price).

Trouble is, you are at the mercy of movers who may not know, for instance, that a cabinet saw should not be lifted by its extension wings. They also may not know where the center of gravity is for each machine. If you're putting faith in a moving company, I would remove extension wings, planer tables and lathe legs, lower a big drill press table as far as it will go and lock your jointer tables in position as best you can. Label your machines with advice for the movers to give them a heads-up: ("Top heavy," "Do not lift here," etc.). Document the condition of your machinery with photos before it gets loaded on the truck so you'll have a record if anything gets broken in transit. An ounce of prevention, right?

Need to move shop? One option is a PODS container. The large ones will hold up to 10,000 pounds of stuff — enough for Chris Marshall to load up shop machines, fixtures and lumber. Brace yourself for, literally, tons of effort.

For our last move, we used PODS® containers instead of hiring movers. Upside: I could load the shop myself. Downside: it's an incredible amount of work! I built simple wood skids, secured each machine with ratcheting tie-downs and wrapped many tools with shrinkwrap. I rented a pallet jack to load them.

Making the skids large enough so their dimensions extended beyond the machine in all directions gave me "bumpers" of sorts to make sure fragile cast edges and painted surfaces wouldn't rub shoulders as they rolled down the highway. You can fit quite a lot of shop stuff in an 8' x 8' x 16' container.

— Chris Marshall

Q I have often seen pictures of woodworkers with "man's best friend" at their sides in their workshop. I, too, at many times have our little dog in the shop when I am working. I think many woodworkers, including myself, probably do not really want to know the answer, but what do the experts say about pets in the workshop?

Father Chrysanthos
Etna, California

Letting sleeping dogs lie in the woodshop is probably not the best idea, according to a veterinarian.

A s a veterinarian, my concerns are both for the pets and the woodworking people who love them.

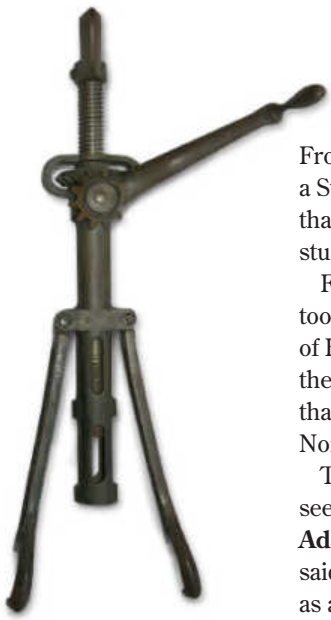
While dust inhalation seems likely to be the great-

Continues on page 16 ...

Stumpers

Two Mysteries; One Solved?

A mystery tool blast from the past



What's This?

Darrel Mathieu of Luck, Wisconsin, learned what this tool is "many years ago." Do you know what it is? Send your answer to *stumpers@woodworkersjournal.com* or write to "Stumpers," Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340 for a chance to win a prize!

Woodworker's Journal editor Joanna Werch Takes compiles each issue's Stumpers responses — and reads every one.

Is it a protractor/compass/scribe? Maybe … or it may remain a mystery.

From time to time, we get a Stumpers mystery tool that truly leaves our readers stumped.

For instance, the mystery tool submitted by **Joe Mollo** of Brackney, Pennsylvania, in the February issue got less than a handful of responses. None of them agreed.

The most likely explanation seems to come from **Ivan C. Adams** of Perry, Utah, who said, "This tool could qualify as a combination compass/protractor that can transfer any angle or circular arc to a surface either parallel or vertical to the reference plane.

He continued, "The point-stop at the tensioned end of the articulating arm can be used as an indexing point for a mobile straightedge held in position by the angled stop at mid-arm. A scribing device can be secured at any location along the mobile straightedge. Such a tool would be useful for replicating a shape multiple times."

Just because a tool doesn't get answered, though, doesn't mean it's necessarily forgotten … as demonstrated by a recent letter identifying a mystery tool originally presented in the June 2000 issue.

Winner! Dan Urban of Glen Ellyn, Illinois, wins a RIDGID 18V Stealth Force Pulse Driver Kit (R86036K). We toss all the Stumpers letters into a hat to select a winner.

Dan Urban of Glen Ellyn, Illinois, wrote, "I was sorting through piles of old woodworking magazines and came across my June 2000 issue of *Woodworker's Journal*. I was flipping through and saw the strange tool in the Stumpers section. It had a handle with four triangular blades at the business end. It had DUE BUOI stamped on it."

This tool originally appeared in June 2000 as a mystery tool belonging to Bill Frerking of East Peoria, Illinois. The cold case remained unsolved … until now.

And then Dan proceeded to solve the mystery. "Just in case the mystery was never solved, DUE BUOI is an Italian maker of knives and other cutting tools for agricultural applications. The tool in question is a budding knife, apparently used in the care of trees. You can see it at *italpro.com/duebuoi* under "Grafting Knives and Tools."

Questions & Answers

continued

est woodworking shop health risk, full disclosure demands that I say, in 36 years of dog and cat practice, I've never seen either species presented for a respiratory tract complaint I could trace to the working of wood. And, as far as I know, no one makes a respiratory filter for pets.

With that in mind, my suggestion would be to remove your pets from any activities that generate small particles, especially sanding. Likewise, the "No Children, No Pets" sign should go up when finishing with materials high in VOCs.

Some pets might have, or develop, sensitivities to certain wood species. Tree allergies are a common malady, especially in the southeastern U.S. species; wood dust and bark can be highly allergenic. In pets, such allergies usually manifest as skin and ear complaints.

Another consideration is trip hazards. A sleeping dog or cat might not see us coming as we carry a gigantic tabletop across the room. Elderly pets present even more concern, as their hearing and eyesight may be poor, and their movements slow.

A falling sharp tool or heavy board could cause major harm to a pet.

As for me, I don't think there's anything safe about having a dog or cat in a woodworking environment, so mine stay upstairs until I'm finished. In fact, I don't interact with them until I've changed clothes after woodworking. I won't take chances with their health.

— Dr. Jim Randolph, DVM

Shop Talk

Going "Cold Turkey"

Each of Doug Wright's turkey strikers and calls is one-of-a-kind and turned by hand.

With His Own Turkey Calls

After years of frustration with factory-made turkey calls, turkey hunter and hobbyist woodworker Doug Wright decided to just quit the store-bought options "cold turkey" and attempt to craft his own. Combining his inherited love of woodworking with his love of the outdoors proved to be a lucrative combination for the young Rockmart, Georgia, native.

"I began making them just a few years ago for personal use. After many botched efforts and drawers of mistrials, I finally crafted one that I was pleased with," Doug said. Only after his first call produced results in the woods would he show it off. "I only intended to make me some calls. Then my friends wanted one. Then strangers wanted them. The next thing I knew, I had dozens of orders." In 2014, he launched Wright Custom Calls (*wrightcustomcalls.com*).

A typical "slate" or "pot" call is made from a basic round disc of slate, ceramic, glass, or copper, then paired with a "striker" made from wood or carbon. When gently "striking" the striker across the face of the call, various turkey sounds like clucking, purring, and gobbling can be produced.

Combining different wood strikers with different plated materials produces hundreds of variations of sounds to choose from, thus an endless combination of pot calls to make. Denser woods like hickory and cherry are slow growing and thus make a tighter wood with a higher pitched sound. On the other hand, fast-growing woods like basswood and cedar are looser wood, making a lower sound, according to Doug.

Building Process

Doug also selects wood for character: ambrosia curly maple "is just so full of unusual line patterns that is just plain fun to look at."

After having the wood milled from trees he has chosen, Doug uses a jig pattern he made to standardize the size of the pot and then hollows out the belly using his drill press. Next, he rounds the square base into the common circular shape with his band saw. Now, it is time for the initial round

Ambrosia curly maple is a "hot item" in wood choices.

In addition to standard pot calls, Doug Wright has created specialty pots known as cluck and purr pots. These are used for soft clucks and purrs such as in high-stake competition calls.

Shown above is an example of a typical finished pot call and striker. One of Doug's favorite calls was made from a pecan tree from his Granny Wright's yard. "It just brings a sentimental value to each hunt I make."

of sanding as the call begins to take the recognizable shape. Then, holes on the bottom are drilled to allow the sound to breathe. This is vital because the holes aid in increasing volume and pitch.

The crucial soundboard is now adhered into the hollow of the call. Doug primarily uses a wooden sounding board. Its height affects the controlling rollover sound — the distinct transition between the pitches of a turkey noise that hunters hope to replicate. Wild bird sounds range anywhere from tight raspy to low throaty calls, and hunters usually have a preference when it comes to the sound they want to produce. After the soundboard is applied, it needs to cure for at least 24 hours, then Doug will do a fine-touch final sanding.

The last stage of making the pot call is applying the surface, which is critical to the outcome of the hunt as well as to the looks of the call. Surfaces can be made from many materials including glass, slate or Doug's favorite, copper. Recently, he has filled custom orders including using glass surfaces with inserts such as photographs or small logo items just underneath the surface on top of the sounding board.

Strikers for the turkey calls are turned and sanded on the lathe to create a desired look and feel.

After the pot is complete, Doug begins on the striker. Generally strikers begin with a rectangular block of wood that Doug shapes on the lathe to the desired look and feel for the grip. After the handle of the striker is turned, a hole is drilled for the peg of the striker. The peg is the true striker and thus is installed as the final step in the entire process.

Ironically, as spring begins to peek through the gray clouds of winter, Doug will not be in the woods hunting turkeys, but in his shop making calls for others to be successful in their hunt.

— Carol Thompson

Woodturning

Cubic Boron Nitride Grinding Wheels

By Ernie Conover

Our woodturning columnist says the newest technology applied to grinding wheels is "the most amazing thing to happen to sharpening in my lifetime."

Jerry Glaser's first sharpening jig for turners was built from wood and metal parts. It pivoted in a block taped to the floor in front of the grinder. If you moved the grinder, you had to move the block — which was also easy to trip on.

In my lifetime, I have witnessed some groundbreaking advances in sharpening of turning tools. In my boyhood, many turners sharpened their tools on oilstones, not owning a grinder at all. It was slow and fussy. Fortunately, my father's shop had several grinders, but we did all of our grinding of turning tools freehand. As I have often stated, freehand sharpening is turning turned inside out: turning's evil twin, so to speak.

Compounding matters, we only had carbon steel tools, which required constant quenching in water, or they overheated and lost their temper. (So did my father.) A beginner often left enough facets in the bevel to make a diamond merchant envious.

A huge advance in turning tools was the introduction of high-speed steel in the late 1960s. The turner no longer had to worry about overheating the tool during grinding. This eliminated the problem of the turner having to pick up the grind where he left off to quench.

In 1982, Jerry Glaser introduced the first turning tool sharpening jig, which separated turning from its evil twin. It positioned the turning tool perfectly against the grinding wheel so that the turner only had to sweep the edge smoothly against the wheel. There was a minimal learning curve and now anyone could sharpen a tool. Tim Clay based his Wolverine and Vari-Grind™ jigs on Glaser's design.

With all this development, the only weak point in the system these days is the grinding wheels themselves. Grinding wheels are akin to pottery with sharp grinding particles mixed in. A new grinding wheel is not round and has to be trued once mounted on the grinder. I've addressed this previously in my video on bench grinders, found on the *Woodworker's Journal* website.

CBN Wheels: The Next Step

Now we have the final step in the evolution of sharpening turning tools. It is cubic boron nitride grinding wheels — CBN for short. A CBN wheel differs greatly from a standard grinding wheel: it is a machined disk of metal, either steel or aluminum, that is coated with cubic boron nitride crystals. The resulting wheel is perfectly round because it was turned from metal, unbreakable (it cannot explode) and very well-balanced. Many are dynamically balanced; you will see drill holes on the side that bring the wheel into balance. The result is that the wheel runs absolutely true with no vibration whatsoever.

www.woodworkersjournal.com
MORE ON THE WEB

VIDEO For a video of the author using cubic boron nitride grinding wheels, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab. You'll also find a link there to Ernie Conover's video on using a traditional bench grinder.

This CBN wheel is from Wood Turners Wonders out of Georgia, one of the sources of these new options for grinding wheels.

Grinding on a CBN wheel is very sedate. On scrapers, the burr is uniform. They grind at lower temperatures and don't create a lot of sparks.

CBN wheels are too wide for most standard guards; the author was able to remount his guards by placing a few washers between the halves.

Boron nitride is a compound of boron and nitrogen with a chemical formula of BN. When its crystalline structure is cubic, its abrasive cutting qualities are analogs to diamonds. The only harder abrasive particle is diamonds, but CBN will hold its integrity at higher temperatures than diamonds. The really juicy plum in the CBN pudding is thermal conductivity. The most common material used in grinding wheels for tool sharpening is aluminum oxide, which is not a good thermal conductor. Because of this, 90% of the heat from grinding with aluminum oxide ends up in the workpiece. CBN is a good conductor of heat, so only 40% of the heat goes into the tool being ground. The rest goes into the wheel, which, being metal, is a good conductor of heat. Thermal properties are so good that there is very little sparking when grinding with CBM and the tool is usually cool enough to touch. Because of this superior thermal conductivity, CBN will dry grind tool steel where diamond wheels will be ruined if used dry.

Pros and Cons

There are some drawbacks to CBN wheels, the first being expense. The typical 6" or 8" wheel costs between $150 and $250. The other drawback is that they will only grind hardened tool steel: mild steel will ruin them. They really work best on high-speed steel but will do fine on carbon tool steel that is Rockwell C scale 55 or above. I feel the expense for even one wheel is justified by the fact that most people will never need to replace it and a good aluminum oxide wheel costs between $50 and $75 and wears out. A solid compromise is to keep a 46-grit aluminum oxide wheel on the left side of your grinder and mount an 80-grit CBN wheel on the right. Do your mild steel and rough tool grinding on the aluminum oxide and final tool grinding on the CBN.

CBN grinding wheels are made from a metal disk that has the cubic boron nitride applied to its rim.

Because there is no danger of the wheel exploding, you can mount CBN wheels at a higher level, giving better visual acuity. If you are also running an aluminum oxide wheel I would not do this, however.

Using CBN wheels is quite a different experience. There is no vibration, there is no shower of sparks and there is not even really loud noise. Only light pressure against the wheel is required. It is all very sedate, and the finished grind is performance art. On scrapers the burr is uniform, working as well as, or better than, one raised on an aluminum oxide wheel. I even grind carving tools on the 80-grit CBN without burning them.

The final problem with CBN wheels is that most will not fit inside the grinder's guards. Most turners are simply removing all guarding on the side that has the CBN wheel. This may be OK because there is no danger of it exploding. Being cautious, I was able to use the guards on my 8" Baldor by putting some washers between the two halves. This leaves a small opening but is still safer than no guards at all. It also allows me to use the rests that came with the grinder in addition to the Wolverine and Vari-Grind supports.

If you use a CBN wheel, you'll appreciate the amazing quantum leap forward that it is.

Ernie Conover is the author of The Lathe Book, Turn a Bowl with Ernie Conover *and* The Frugal Woodturner.

Reader's Survey

Cutting the Cord — Drill/Drivers

By Woodworker's Journal Staff

These days, it's hard to imagine a woodworking shop — or even a New York apartment — without a cordless drill or two. We decided to ask our survey group about their drill/drivers and how they use them. As usual, you folks gave us a surprise or two!

In the beginning, man created the Makita 6093!

98% of woodworkers own a cordless drill/driver. (The paper clips of the woodworking world?)

www.woodworkersjournal.com
MORE ON THE WEB

For more about the most unusual ways readers have employed a drill/driver, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

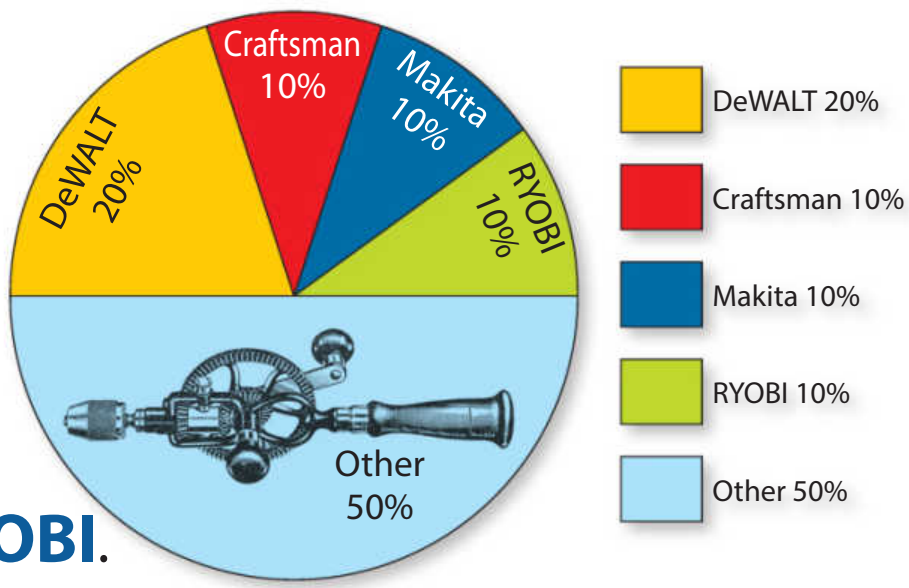
What do you use your drill/driver for?

#1 Woodworking projects

#2 Home improvement projects

Dead last: Lending my drill to the neighbor

More folks own **DeWALT** drill/drivers (20% of respondents). Coming in next at 10% were **Craftsman**, **Makita** and **RYOBI**.



Bigger is not better. Only 6% of woodworkers own drill/drivers with 24-volt or larger batteries.

On the other hand, battery power/voltage was the most important feature for woodworkers selecting a drill/driver.

Bet you can't buy just one! **85%** of woodworkers own more than one drill/driver. **58%** own more than three. *That is a lot of drill driving!*

92% of woodworkers still use a corded drill from time to time.

Lithium-ion has won the day, now garnering **48%** of the market.

The Oddest Use

We asked, "What is the weirdest thing you've done with a drill/driver?" ... Boy howdy! A short list is below.

Stirring Paint
Mixing mortar
Powering a lathe
Mixing pancakes
Emergency flashlight
Powering a meat grinder
Planting tulip bulbs
Cleaning a gun
Killing a mouse
Lowering stabilizers on a trailer
Winding bobbins
Cleaning potatoes
Powering a water pump
Drilling a fingernail to relieve a hematoma
Starting a lawn mower
As a wheel chuck
Drilling for oil
Mixing peanut butter
Stirring a pot of gumbo
Stripping fishing line
Mashing potatoes
Twisting wire
Lowering a falcon kite
Degassing wine
Cleaning the shower
Remove a cast from fractured arm (I'm a doctor)
Tapping maple trees
Sound effects for my electric guitar
Scaling fish
Buffing my shoes
Making margaritas
Chasing my bulldog who barks at it
Burglar alarm
Holding something down as the glue dries
Ice fishing auger
Grinding pepper
Making a fishing rod leash
I once drilled a roach ... not the kind you smoke
Whipping candle wax
For hammering
Rolling back car odometer
As a mini-lathe
Making paper pulp
Turning cabinet knobs
Sanding toenails
Pulling BBQed pork
Winding banjo strings
Killing a salmon

Oar Chair

By Peter Marcucci

This unique project makes use of some interesting techniques to create a lovely chair which blends found material and solid custom woodworking.

I enjoy making furniture from repurposed wood or found objects. If you live in an area where boating is popular, you might just find some old oars lying about. Once discovered, many of these garage sale finds are destined to be "wall hangers" in a restaurant or a man cave. Instead, why not make a chair from an oar and bring new life to a long-forgotten object? My first oar came from an old boat at our family cottage. I acquired a second pair of oars from an Internet classified ad site.

The three-legged design and slender back of an old Irish Tuam, or Sligo, chair provided the inspiration for this version. Although primarily a decorative or hallway chair, it is fully functional. The legs angle outward for stability. The oar blade, slanted at 5˚, supports your back, and the deeply sculpted seat is very comfortable.

Like a Windsor chair, the seat is the main structural element. Round tapered tenons attach the front legs. The rear leg/back assembly is attached using a built-up construction I call a Maloof joint: a feature of Sam Maloof's iconic rocking chair. An optional marquetry panel decorates the chair back.

Getting Started: The Legs

The oar needs to be at least 6' 6" long and 1½" to 1¾" in diameter. From this length, you can cut the chair back and two front legs as shown in the *Drawings* on page 29.

The blade portion of the oar, which becomes the chair back, should be cut 36" from the top. The remainder of a 6'6"-long oar yields two 20" pieces for the front legs.

A shop-made angle block (inset photo) helps to mark and cut the tenons. Drill a hole through a 2½"-square by 3"-long block to match the diameter of your legs. Then trim ends at 5° and 20°. With the oar blade clamped parallel to the workbench, use the angled layout block and a flush-trim saw to cut the angles and lay out the tenons (photo at right).

I turn a 1¾"-diameter back leg from an additional straight-grained 2" x 2" blank about 20" long. If you have an 8' oar, you will be able to cut all four of the main pieces: two front legs, the back leg and the seat back.

Once cut from the oar, turn an "oar handle" on the second leg to match the handle on the first leg. Some oars taper in diameter along their length. If this is what you have, turn both pieces to a consistent diameter. Finally, rough out a tapered 6° tenon on the front legs. You will return later to finalize the tenons.

Fabricating the Angled Back

The chair back and back leg are joined together with their tenons encased within laminated blocks of wood. Those blocks also provide the additional material to cut the three-sided dado for the Maloof joint.

To get started, I used a shop-made angle block (photo, top center) to guide the angles and mark out the two 1" x 1¼" tenons. On each face of the block, mark the vertical centerline of the hole. One-half inch on either side, mark two additional lines that define the tenon cheeks. It is important that the tenon cheeks on the chair back are cut at 90° to the face of the oar blade. Otherwise, when the chair is assembled, the face will look twisted.

Add a spacer block underneath the blade so that the oar is parallel to the workbench top and insert the other end into the angled layout block using the 5° face. Clamp the oar blade parallel to the benchtop. Once positioned, clamp the angle block to the bench. With a flush-trim saw, cut the face at 5° (photo, top right) and then use the reference lines to mark the tenon cheeks.

Without loosening the clamp on the oar blade, slightly loosen the holdfast on the angle block and slide it back 2½". Secure it again and then extend the cheek layout lines back from the front face. The tenon shoulders can be cut with a flush-trim saw using the angle block as a guide. I saw the cheeks by hand, taking care to ensure that the cheeks are cut parallel to the axis of the back.

Use the 20° face of the angle block to lay out and cut the tenon for the back leg and form the tenon in the same way. The next step is to sandwich the tenons within blocks of wood for the Maloof joint. I used ash for the added blocks and back leg because of its strength.

Clamp the back leg tenon to the first block. Then butt the seatback tenon in place and test for a tight fit. The ends of tenons should touch and the shoulders should fit tightly to the edges of the block (right photo, second from bottom). Trim the block or tenon length as needed.

Before gluing the tenons, clamp them in place and visually check that the assembly is straight and plumb. If not, one of the cheeks is tapered or skewed. Plane the cheek as needed to make it

Use the layout lines on the angle block to mark the cheeks of the tenon before cutting them.

Begin by gluing the back leg tenon to the first block. Once the glue has cured, position the seat back tenon and glue it in place.

With both tenons glued to the first block, build up the Maloof joint by fitting and gluing the remaining wooden blocks around and over them.

The author uses a crosscut sled to cut the notch for the seat portion of the Maloof joint. He attaches a block outfitted with a 1/4-20 bolt as a fine-adjust system to increase accuracy.

With a 1/2" rabbeting bit, form rabbets on the notch. In stages, cut the rabbet on one side, then flip the seat over and rout the other side. It is important that the rabbeting bit has an outside diameter of 1½" so it forms 3/4"-radius corners in the joint.

The next step in the Maloof joint is cutting a dado on the front and side faces of the built-up leg joint. Sneak up on the final thickness.

parallel to the vertical axis of the back and leg.

Begin by gluing the back leg tenon to the first block. Once dry, position the seat back tenon and glue it in place.

To fill in the center section, cut two filler pieces from the second block, and fit and glue them in place. Next, plane the top face surface of the glue-up to remove any unevenness between the tenons and filler pieces.

Glue on the third block to complete the sandwich. Finally, check that the front face and sides of the block are square to one another. Make any needed adjustments with a hand plane.

Making the Seat

Glue up enough 2"-thick boards to make up your seat blank. Cherry provided a good color match for the oars that I acquired. Take some time to arrange the boards in order to create a pleasing grain pattern.

Once the seat blank is cut to size and squared, it's time to form the seat portion of the Maloof joint. This joint is incredibly strong, and once sculpted it is also very attractive.

Use a crosscut sled to make a series of kerf cuts to form a notch into the seat blank. The notch is 1¼" deep. Cut the notch 1" narrower than the width of the built-up wooden blocks. I cut the notch 1$^{15}/_{16}$" wide (photo, above left).

Smooth the saw kerfs in the notch by paring with a chisel. Finally, rout the top and bottom of the notch with a 1/2" rabbeting bit that has a 1½"-diameter cutter. Rout a 1/2"-deep rabbet on the top and bottom of the notch, leaving 1" of material between the rabbets (photo, top right).

Test-fit the built-up leg component of the Maloof joint in the seat opening. If it is too tight, adjust the thickness with a hand plane so that it slips into the opening of the seat joint.

To complete the Maloof joint, cut a 1"-wide dado on each side and the front face of the leg component. I use my crosscut sled to make this cut. I set the blade at just shy of 1/2" high, as shown in the photo at left. Then I used a narrow shoulder plane to clean up the kerf marks and bring the dado to its 1/2" final depth. Plane away just enough for the back to fit snugly into the seat joint.

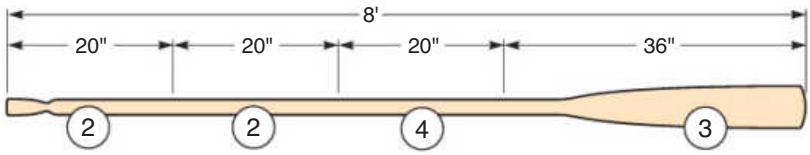
To complete the block portion of the joint, rout the edges with a 3/4"-radius roundover bit (photo, below).

Insert the back onto the seat, tapping it into place with a mallet. Adjust the fit by planing, sanding or using a rasp. Mark the high spots and remove the material that is keeping the joint from seating properly (photo, bottom).

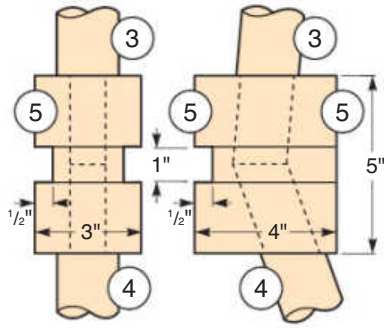
To complete the shaping of the Maloof joint's leg portion, rout the edges with a 3/4"-radius roundover bit.

To get a gap-free fit, look for areas along the top and bottom where the leg section of the joint has "bottomed out." Mark these areas with a pencil. Remove the leg and lightly sand these "high"spots until the joint fits together snugly.

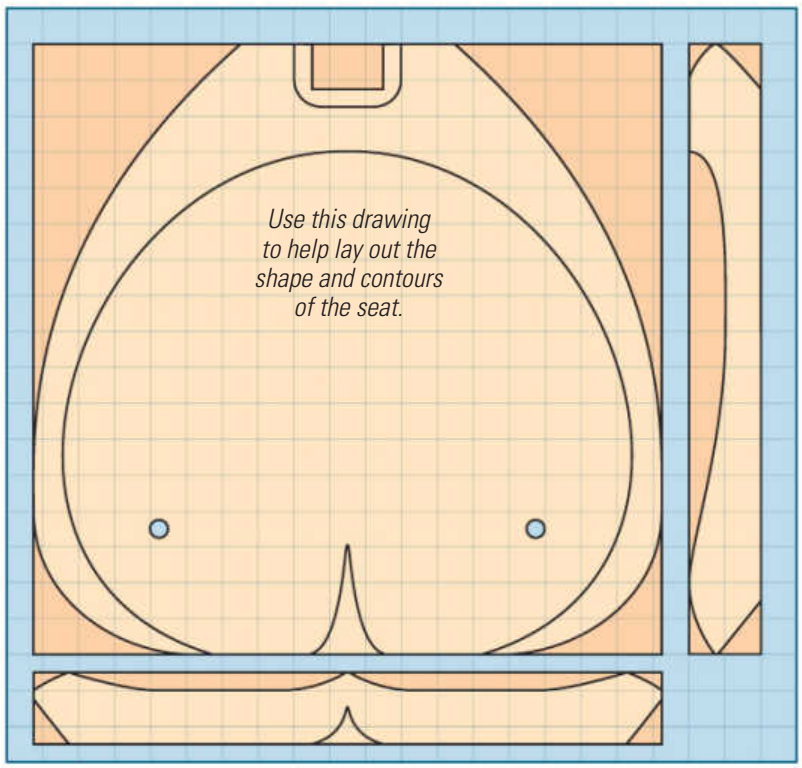
Cutting the Oar



Maloof Joint
(Front and Side Views)



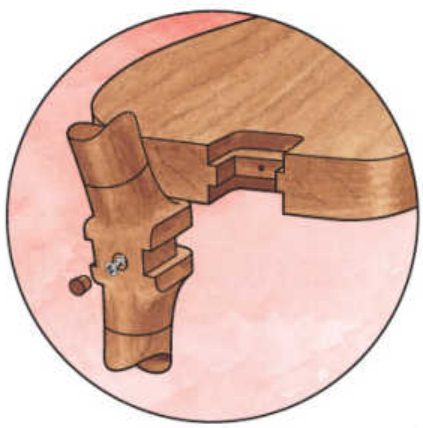
Seat Layout
(Top, Side and Front Views)

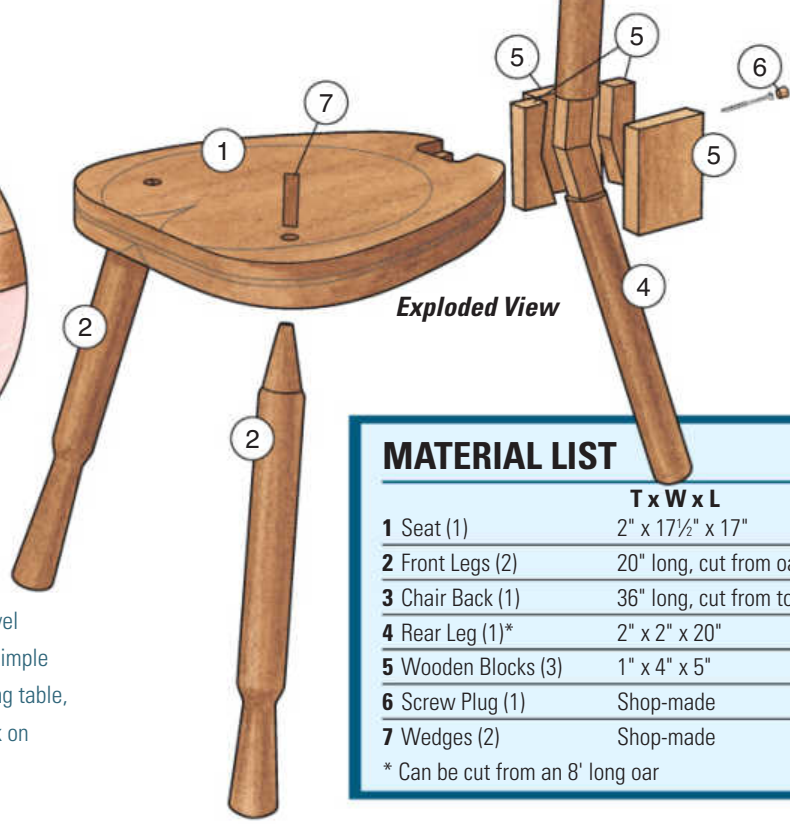


Each square = 1"

The author decorated the blade of his oar with a marquetry image. A painted or woodburned embellishment would also be attractive. Or, you can leave the blade plain instead.

Maloof Joint Detail





Exploded View

MATERIAL LIST

	T x W x L
1 Seat (1)	2" x 17½" x 17"
2 Front Legs (2)	20" long, cut from oar
3 Chair Back (1)	36" long, cut from top of oar
4 Rear Leg (1)*	2" x 2" x 20"
5 Wooden Blocks (3)	1" x 4" x 5"
6 Screw Plug (1)	Shop-made
7 Wedges (2)	Shop-made

* Can be cut from an 8' long oar

www.woodworkersjournal.com
MORE ON THE WEB

VIDEO For a detailed video on the double bevel marquetry process, plus the author's simple instructions for a shop-made marquetry cutting table, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

The legs are slanted 18°. To help line up the drill, set a sliding bevel at 18° in line with the site line. Set another square perpendicular to the site line.

Use a reamer to taper the bore to a 6° angle. The sliding bevel and square orient the reamer. Periodically insert the leg into the tapered hole to check the angle. Adjust as needed.

The tapered tenon cutter is like a big pencil sharpener and cuts a 6° taper. If you don't have the reamer and matching tenon cutter, a turned tenon and a 5/8" bored hole are acceptable.

Drilling Holes for the Legs

To begin, locate the center point of the leg sockets on the underside of the seat. Then mark the site line measuring back 11½" from the front edge of the seat and joining this point to the socket center point. The leg is slanted 18° from vertical along the site line.

I use a 5/8" spade bit to drill the socket in the seat from the bottom, as shown in the above left photo.

Bore the hole in stages, periodically checking the angle. I use a 5/8" dowel inserted in the hole to check the angle. Adjust accordingly, if you stray.

Once the holes have been drilled, use a reamer to taper the inside of the hole to a 6° angle (center photo, above).

To finalize the tapered tenon on each leg, I use a 5/8" tapered tenon cutter. As you shape the tenon's end, periodically insert the leg into the tapered mortise and check the height. Continue turning the taper until the height from the top of the seat to the bottom of the leg is slightly more than 17". (Once the legs are glued in place, it's easy enough to make final height adjustments by sanding away some material from the bottoms of the legs.) *Editor's Note: If you do not have a reamer and a tapered tenon cutter, you can modify the leg mounting technique.*

Shaping the Seat

Now that the seat joinery is complete, it's time to sculpt the seat. Use the *Drawings* on page 29 to mark the seat shape on the face and sides of the seat. Then cut the outer shape of the seat at the band saw. Sand away any saw marks and fair the curves.

I like to set the contour depths at various places on the seat by drilling a series of depth holes (photo, below left). These will provide reference points as you carve the shape of the seat.

There are many ways to sculpt seat contours, and all of them work well enough. I prefer to rough-carve the seat using an angle grinder and a Kutzall® Dish Wheel. Hog out material to the depth holes, leaving the point of the hole still visible. Grind close, but not to, your layout lines (photo, below right).

Once the seat has been rough-ground, use a 30-grit sanding disk to bring the seat to its final shape. Be cautious here: remove a minimal amount of material from around the leg mortises. You want to leave as much seat thickness in these areas as possible, for strength. The best

With a brad point bit, drill a series of depth holes (in the locations identified on the template) to help you gauge your carving depth. Take care not to drill too deeply ... that would be a difficult error to hide.

The author prefers to rough carve the seat using an angle grinder and a Kutzall wheel. Hog out material to the depth holes, leaving the point of the hole still visible. Grind close to, but not to, your layout lines.

Refine the seat's shape with a 30-grit sanding disk. Carefully sand the curves to your layout lines, removing any roughness from the initial grinding and bringing the seat to its final contours.

Mark the transition curves on the leg and rough-cut the shape at the band saw. Use a narrow band saw blade, and take your time with the cuts. Remember, it is easier to take off material with a rasp than add it to the joint later.

way to judge the seat's transition and fairness of curves is with your fingers. By feeling across the seat, you discover any high or low spots and are able to check the symmetry between the two halves of the seat.

Next, form the bevels on the top and bottom of the seat using your layout lines as a guide. Thinning the edge gives the illusion of lightness to what is otherwise a thick seat.

Flip the seat over and round over the front edge with a rasp to create the "smile" on the underside of the seat that accentuates the pommel. I fine-tune the shaping with a rasp and my random orbit sander using 80- or 100-grit disks. Then, with the sander and by hand, I progress through the higher grits until I achieve a scratch-free surface.

Carving the Maloof Joint

It's time to sculpt the back leg joint. Begin by marking the transition curves on the leg block, and rough-cut them at the band saw (photo, top right). Refine the joint curves with a rasp. Shape as much as you can with the back assembly off the seat. Then temporarily install it to finalize the shape, fair the curves and blend the joint seamlessly into the seat (right photo, center). Once you are satisfied, drill a pilot hole through the back and into the seat for a 3"-long, #12 wood screw.

Do a final sanding of the seat, legs and back in preparation for assembly and finishing. Hold off on final assembly until you have decorated the oar blade (if that's what you plan to do).

Decorating the Back

I inlaid a marquetry scene into the blade of the oar. There is more information about that in the "More on the Web" content online. A painted or wood burned decoration would be as suitable if the thought of marquetry might be a bit overwhelming. You can also leave it plain.

Shape the seat joint with rasps and then sand smooth. Start with a Four-in-Hand Rasp and move on to finer-toothed files. Test fit and finish on the chair.

Installing the Legs

Assembling the chair is straightforward, but it's a good idea to do a dry run, making sure you have all the clamps and cauls you will need. Apply glue to the Maloof joint, tap it in place and then use a clamp to draw it tight. Install the screw and cover it with a wood plug.

Orient the front legs with the straight grain facing forward. Mark a line across the top of the tenon, perpendicular to the grain direction, and cut a slot in the tapered tenon to accommodate a wedge.

Apply glue and hammer the legs into the seat. Glue and drive the wood wedges in to lock the legs in place. Then trim and sand the tenons flush with the seat.

Applying a Finish

I left much of the original color and patina of the oar. After applying a spit-coat of shellac, I stained the new parts and those areas where the original finish was removed. Several coats of wipe-on poly were applied to the whole chair, rubbed out with 0000 steel wool and waxed. I was happy with the results.

Cut a slot across the grain on the end of each leg for a wedge. Apply glue to the leg tenon, then hammer it into the tapered seat hole. Glue and drive the wedges to lock the legs in place.

Conclusion

If you like the look of this project, keep your eyes peeled for used oars. You might find them at a garage sale, in online classified ads, or when taking a trip to the seashore. Then go ahead and make a chair from an oar.

Peter Marcucci is a woodworker from Ontario, Canada. Most recently, he has focused on making decorative chairs and reproducing Charles Rohlf's Arts and Crafts era furniture.

Compound Cut Flower Box

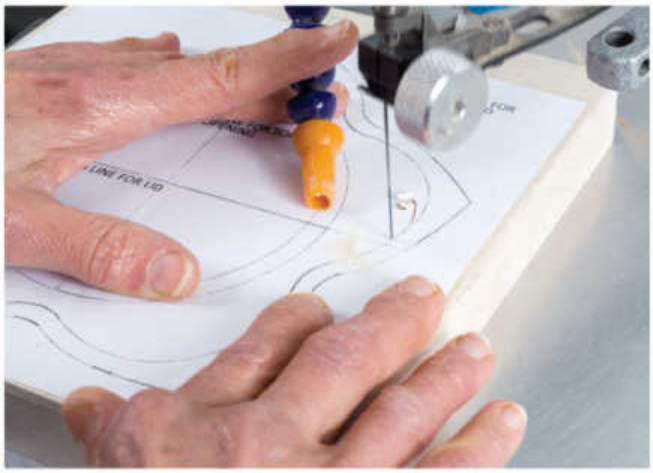
By Carole Rothman

Our author's memories of making festive cakes with sugar paste flowers inspired this petal-shaped box, topped with a compound-cut flower and dainty butterfly.

Looking for something fresh and different, I decided on a box with a floral decoration that would rival any found on fancy cakes in bakery windows. I started by covering the hard maple blank for the box body with clear packing tape to reduce burning, and attached the pattern, aligning it with the grain. I drilled an entry hole inside the inner cutting line, inserted a #7 Polar blade, and cut out the center of the box. I removed the pattern from the center waste to save for the lid and lid liner.

I smoothed the cut area with my spindle sander, and hand sanded the lower edge to remove "fuzzies." I glued the body to the wood for the bottom, and clamped it in a press. After 10 minutes, I removed the piece, cleaned up squeeze-out, and re-clamped it. When dry, I cut the box perimeter.

The blade entry hole allows access to the box interior while keeping the sides intact. Drilling close to the cutting line preserves blade life.



For a well-cut box interior, be sure your blade is square to the table and don't force it through the thick wood.

The box interior is easy to sand with an appropriately sized spindle. Work one lobe at a time until all blade and burn marks are gone.

Next, I attached a copy of the box pattern to the wood for the top, aligning it as for the box body. I drilled a hole inside the smallest circle, inserted a #3 blade, and cut the opening. I then cut the outer profile. (See photo at right.) To smooth the piece, I used both spindle and detail sanders. I brushed a sealer coat of shellac on the box interior and lid underside, avoiding gluing surfaces, and sanded the pieces smooth when dry. I then glued on the top and clamped the assembly until dry.

Because of the small top opening, the interior surfaces are sealed and sanded before the top is glued into place. A small silicone brush helps apply the correct amount of glue for attaching the top.

To rough-sand the sides of the box, I used a 3/4" spindle for the in-curving spaces and a belt sander for flatter areas.

I then used a detail sander for the top, bottom and the flat sides of the petals, and a small pneumatic drum between the petals, working through the grits to 220. The same drum softened the box edges, and was followed by hand sanding. I applied a sealer coat of shellac to the outside of the box, then sanded smooth.

Taking off the top of her largest press to remove squeeze-out, then replacing it, didn't disturb the glue bond on the box body/box bottom assembly.

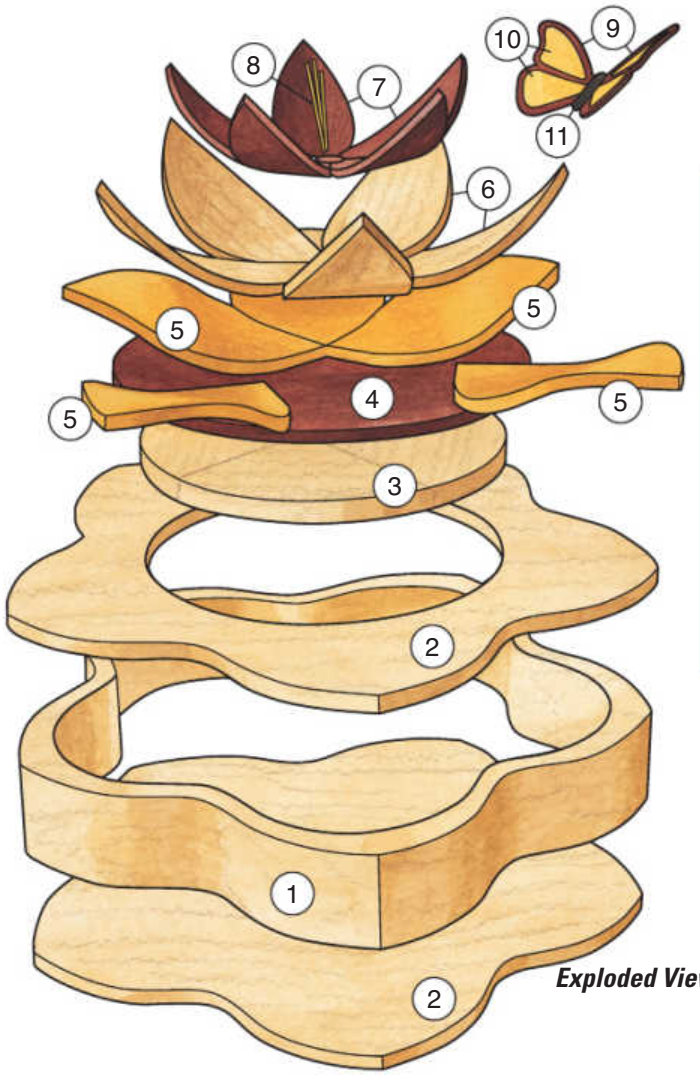
Making the Lid

To make the lid, attach the reserved pattern to the purpleheart and mark the center with an awl. Cut the perimeter with a #3 blade; remove and save the remainder of the pattern for the lid liner. Sand the edges smooth with the belt sander, and use a pneumatic drum to curve the upper edge. I sanded both faces to 220-grit and softened the lower edge by hand.

To minimize the tendency of very thin lids to cup, I made a thicker lid liner from two squares of wood cut into segments and re-glued so that all sides

For a sleeker look, the author used a box top with a small, round lid. The center hole of the box top accommodates the lid liner, which secures the decorated lid.

A press with a round shape and smaller size, along with a staggered sequence of tightening, provided even pressure on the petal-shaped lobes.



Exploded View

MATERIAL LIST

	T x W x L
1 Box Body (1)	1⅛" x 8" x 8"
2 Box Top and Bottom (2)	3/16" x 8" x 8"
3 Lid Liner (1)	1/4" x 4½" x 4½"
4 Lid (1)	1/8" x 5" x 5"
5 Outer Petals (6)	3/4" x 1¾" x 3"
6 Middle Petals (6)	3/4" x 1½" x 2¾"
7 Inner Petals (3)	3/4" x 7/8" x 1¾"
8 Stamen Blank (1)	veneer x 3" x 15/16"
9 Butterfly Wings (2)	1/16" x 2" x 2½"
10 Butterfly Wing Decorations (4)	veneer x 2" x 2½"
11 Butterfly Body (1)	1/8" x 1/2" x 1½"

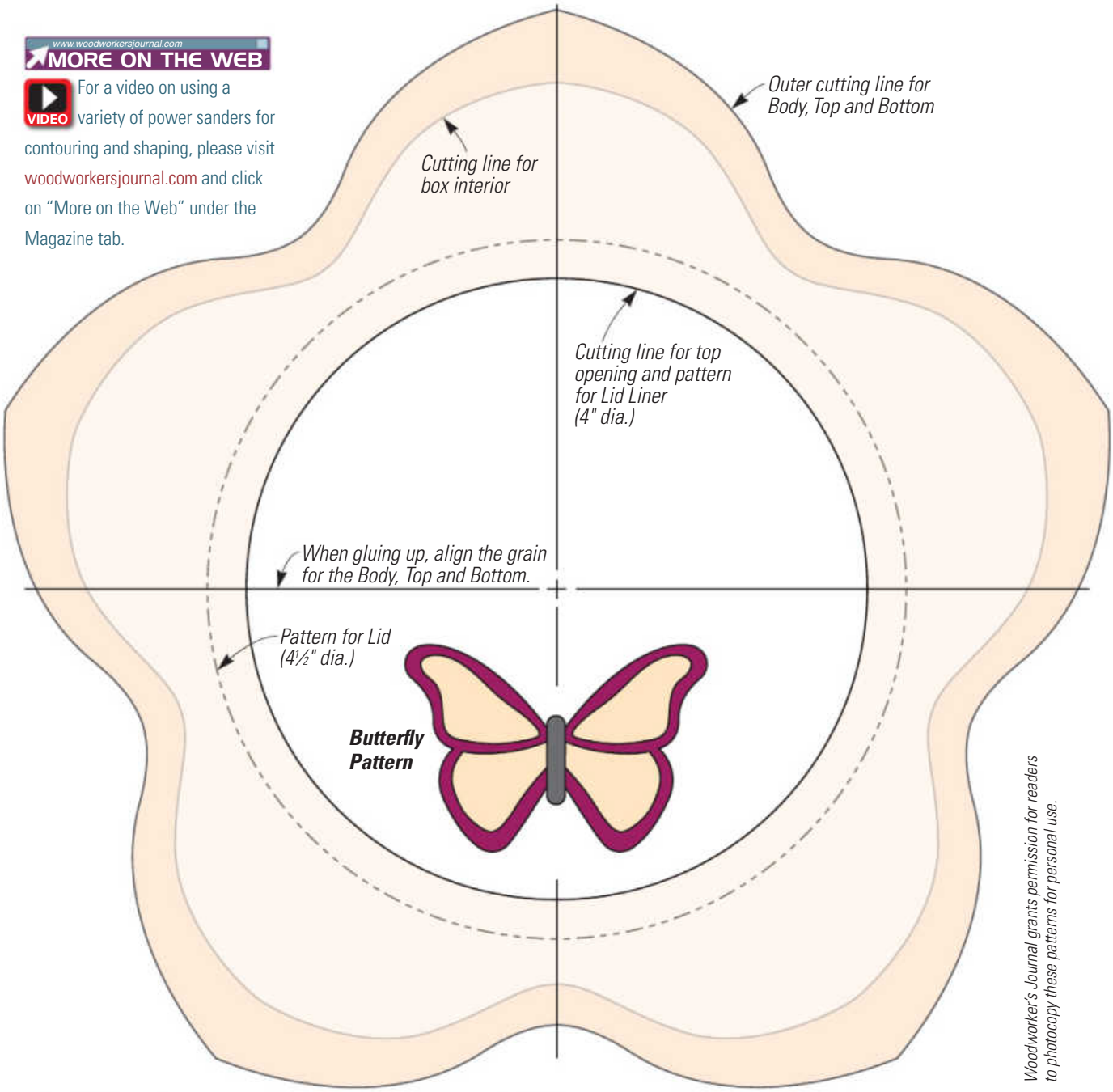
were either face or end grain. First, I cut each square on the diagonal, jointed the cut edges, inverted one half, and re-glued the pieces to create a chevron. I cut each re-glued piece in half on the diagonal and exchanged halves so that when glued, each new blank would have either face grain or end grain on all edges. (See photos on top of page 36.) I attached the saved pattern to one blank, cut the lid liner, and sanded the piece smooth. To check the fit, I attached a loop of tape to one side of the lid liner and held it in the top opening to check the clearance when rotated. I sanded any high spots lightly with the belt sander.

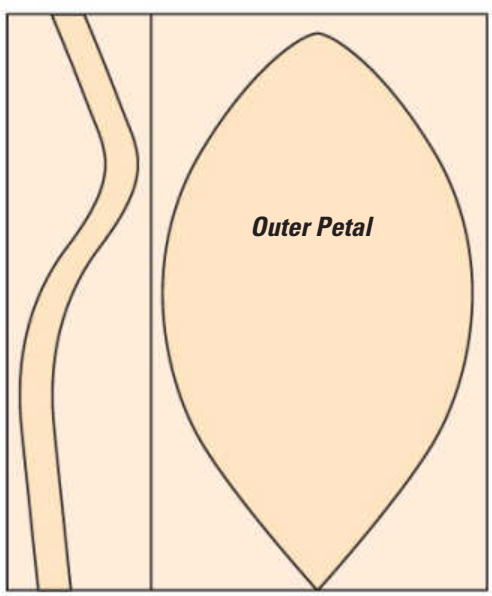
To position the liner so that the lid is centered, attach it to the underside of the lid with a loop of masking tape, and hold the pieces firmly together. Insert the lid into the box, grains aligned, and measure the distance from each indentation to the lid's outer edge. If there are deviations, move the liner and remeasure. When the lid is centered, make alignment marks on the lid and liner, and separate them. I applied drops of Nexabond™ glue across the liner surface, placed it on the lid using the alignment marks, and held the pieces firmly until just set. I used a makeshift clamp to ensure a good bond, then let the pieces set fully. I masked a 2½" area in the center with blue painter's tape and applied a sealer coat of shellac to both sides of the piece. When dry, the tape was removed and the lid sanded smooth.

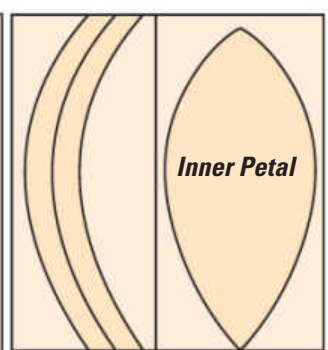
Cut the lid carefully to ensure a well-rounded shape. A small pneumatic drum, chucked into a drill press, gives a great deal of control as you round and thin the upper edge of the lid.

www.woodworkersjournal.com
MORE ON THE WEB

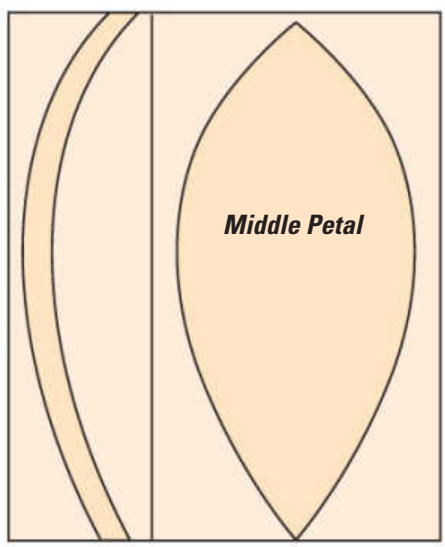
VIDEO For a video on using a variety of power sanders for contouring and shaping, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.







Cut two petals from each blank of purpleheart for the Inner Petals. (This creates one extra petal.)



All the patterns on this page are full size.

Making a blank for a lid liner that resists cupping requires two pieces of wood, prepared the same. First, cut them in half on the diagonal.

Next, invert one half of each piece and glue it to its mate, using Nexabond, to form a chevron. When the pieces have set, make a second diagonal cut across the uncut corners.

Exchange the halves of the two pieces, then re-glue for two new squares. When cut into a circle, all edges will have the same grain.

To center the lid, accurately position the liner on the underside. Establish and mark the correct position on both pieces, then glue and clamp until fully set.

Forming the Petals

The contoured flower petals are what really bring this box to life. I attached each petal pattern to its corresponding blank, allowing for one extra of each type, and switched to a zero-clearance insert. For the yellowheart and aspen petals, I sandwiched the blank on edge between blocks of wood, using small clamps for stability, and cut the side profiles with a #7 Polar blade for the yellowheart and #5 for the aspen. After cutting the sides, remove the blocks and tape the pieces together. Place the blank on its back, and cut the petal outline, then remove the petal from the blank. For the purpleheart petals, I used the #5 blade and clamps without support blocks, cutting two petals from each blank.

When cutting larger petals, stabilize the blanks with blocks and clamps. Downward finger pressure will control tendencies to jump or bounce.

The generous thickness of the petal you remove from the blank allows you to correct for irregularities when the petal is thinned and shaped.

A belt sander worked well for smoothing the petal's edges and flat surfaces, then my spindle sander for the curved areas. I sanded them to about 3/32" thickness, and finished up with a small pneumatic drum and 220-grit sleeve, thinning the petal to about 1/16", and rounding over the top edge. I masked the gluing surfaces and applied a sealer coat of shellac. When the petals were dry, I sanded the finish smooth.

Before gluing on the yellowheart petals, I did a "dry run" by attaching a loop of masking tape to the underside of each petal and pressing it into place on the lid. The gluing area of each petal should be flat, the bottom tips should meet at the center, and their outer points should alternate with those of the box. Sand the bottoms and sides of the petals as needed. Glue the petals on, one at a time, using Nexabond, and hold them firmly until set. Repeat this process with the aspen petals, placing them between the yellowheart petals, tips meeting at the center. Do not attach the purpleheart petals yet.

Blue painter's tape is used to mask all gluing areas of the petals and lid before the sealer coat of shellac is applied. Once the shellac has dried, the petals are attached one at a time with Nexabond.

The author cut the yellow veneer into the stamen pieces by tapping a razor blade as shown. Make plenty of extras to allow for breakage.

A drill press clamp prevents movement when drilling the hole for the stamens. Avoid excessive pressure or you may loosen or damage the petals.

After the purpleheart petals are trimmed back, glue them into place. Work one petal at a time, and hold the glued end down until the petal maintains its position.

Making the Stamens

Clamp the lid to the drill press table and drill a 3/16"-deep hole at the center with a 1/4" bit. Tape the purpleheart petals into place. Their tips will overlap the drilled hole. Mark the overlap, remove the petals, and sand the tips to meet the edge of the hole. Reposition the petals and glue them into place. To make the stamens, place the strip of yellow veneer on scrap wood and use a razor knife blade to cut thin strips along the grain, tapping with a hammer to cut the strip. Cut about 25 stamens and gather them for a dry fit. They should fill the hole and flare out slightly. Remove the stamens and hold them together at the top. Place two drops of Nexabond into the hole, push the stamens in firmly, and adjust them as you'd like. Use a tweezers to remove any that break. If you prefer, you can use commercial stamens made for cake decorators.

Making the Butterfly

To make the butterfly, stack the two pieces of purpleheart together and secure their edges with masking tape. Attach the butterfly pattern and cut along the outside of each wing with a small blade. Select the best two pieces and sand their edges and faces. Tape the four pieces of yellow veneer in the same manner, but sandwich them between thin wood for stability. Attach the butterfly pattern and cut the inner wing pieces. Select the four best pieces of each shape and glue them to both sides of the wings. Sand the wings smooth and the gluing edges flat. Sand a slight bevel where the wing will attach to the body.

Now cut a 1/8"-wide strip from one long side of the ebony and cut the strip in half to make two bodies. Choose one, and flatten the sides and round the ends. Apply Nexabond to the beveled edge of one wing, using a toothpick to spread it evenly. Place the body on a nonstick surface, hold it firmly in place with a toothpick, and attach the wing. Use a small wedge to hold it at the desired angle until the glue is dry. Repeat with the other wing and let set until firm. Apply a coat of shellac to both sides of the wings and the top of the body. Decide where you want the butterfly to land and sand that area of the petal. Attach the butterfly with Nexabond and hold until set. Apply several coats of spray lacquer to the lid assembly and box exterior, rubbing between coats with 0000 steel wool as needed.

Now you have a nice-looking box that you can use for your own storage needs, or it will make a great gift. If all of your butterfly wings came out looking great when you were stack-cutting them, you can even let your fancy take flight into another project.

The butterfly wings are stack-cut for ease of cutting. This will give you four wings. Choose the best two for your project.

For better control, sandwich veneer for the wing decorations between thin pieces of scrap wood. Cut extra decorations to allow for breakage.

A toothpick helps position the veneer when gluing the fidgety decorations to the butterfly wings.

To be sure your support blocks are at the correct angle, do a dry fit before gluing on the wings. Use a toothpick to stabilize the body as you glue.

Carole Rothman is a former cake decorator and the author of Wooden Bowls from the Scroll Saw *and* Creative Wooden Boxes from the Scroll Saw*, both published by Fox Chapel.*

Two Go-to Jigs

Handy shop helpers cut accurate miter angles and secure workpieces for chopping dovetail shoulders.

Miter Cutting Sled

By Don Phillips

A swiveling arm and multiple pre-set stops enable this table saw sled to cut miter angles quickly and accurately.

Recently, I wanted to make a garden lantern that required quite a few small, but accurately sized and mitered pieces — and I didn't want to make them on the chop saw. I have to confess that I've never had a totally satisfactory relationship with the chop saw (or miter saw, if you prefer that name), despite the fact that I own a well-recommended model from a good brand. While I am sure that they are extremely useful in house building and general carpentry, I find that the short back fence and the small table don't allow me to control the material as much as I want to for fine woodworking.

So, what to do for the small, mitered pieces for my project? This is my answer: it's a sled with a swiveling arm that locks to my most important miter angles and holds workpieces securely for cutting. Here's how to build it.

Making the Base and Arm

The first requirement is a good base. Mine is made of oak and measures 3/4" thick by 12" wide by 16" long (see *Drawing*, facing page). Plywood would work fine, too. Either way, chamfer the corners to reduce splintering.

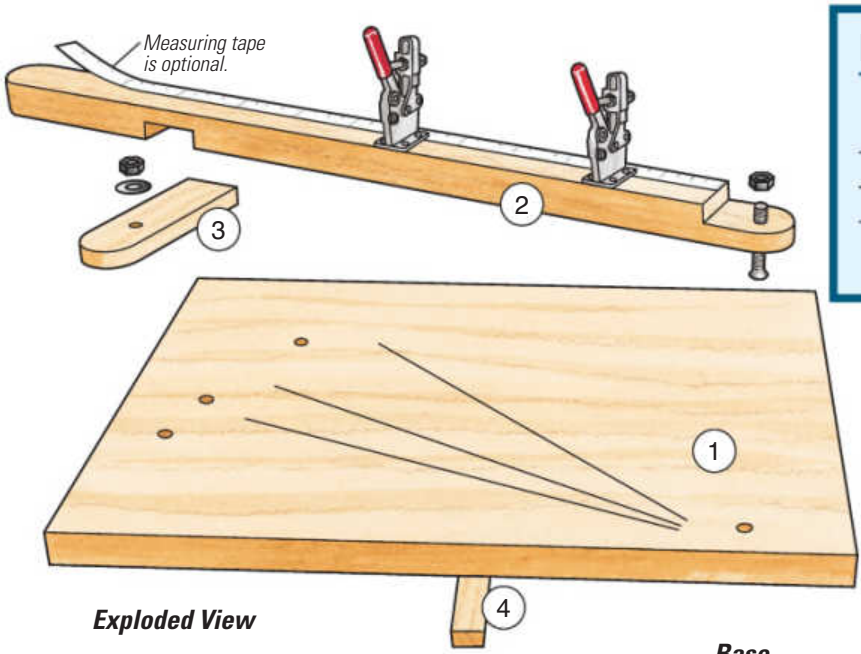
The second component is a swivel arm, also made of oak. After ripping and crosscutting it to size, I rounded the ends at the band saw and used a sanding drum in the drill press to smooth the curves.

On one end of the swivel arm, I drilled a 5/16" centered hole through the piece, then removed half its thickness for the first 1½" of length (see bottom left photo, facing page). Measure 4" in from the other end and cut a 3/8"-deep, 1¼"-wide dado into the bottom face for the arm brace. Make the brace so it fits snugly in the dado, but before gluing and screwing it to the arm, round over its end and drill a 5/16" centered hole through it. Elongate this hole with a rattail file to about 1/2".

Installing the Arm

Here's how to install the arm. First, position and clamp the swivel arm to the base so the pivoting end is about 1½" in from the bottom right corner. Now, using the arm hole you already drilled as a guide, drill a matching hole through the base. Then remove the bit from the drill press and use it as a pin to line up the holes in the two components.

The jig requires two 5/16" x 1½"-long flathead cap screws or carriage bolts. The first of these fasteners is going to be the fulcrum of the swivel arm. It

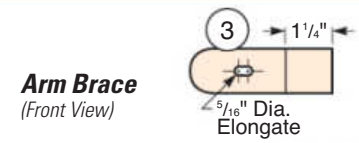


Exploded View

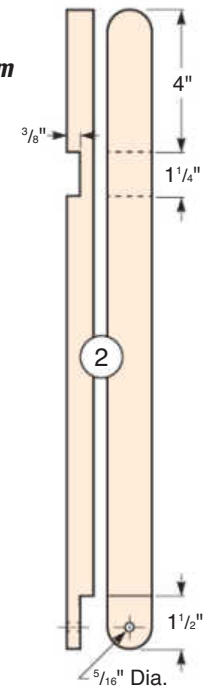
MATERIAL LIST

	T x W x L
1 Base (1)	3/4" x 12" x 16"
2 Swivel Arm (1)	3/4" x 1¼" x 18"
3 Arm Brace (1)	3/8" x 1¼" x 4"
4 Miter Slot Bar* (1)	3/8" x 3/4" x 12"

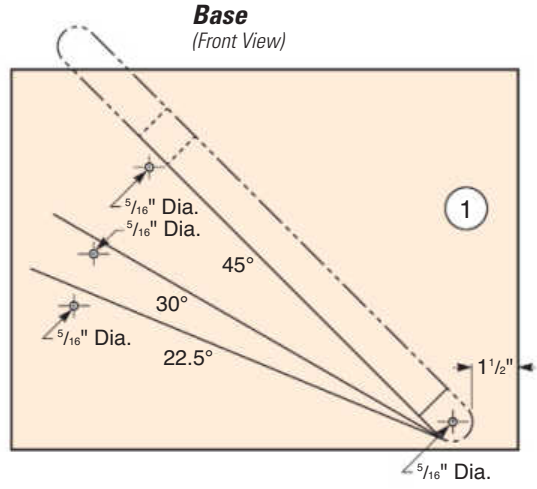
** Optional, fit to miter slot width*



Arm Brace
(Front View)



Swivel Arm
(Front View)



Base
(Front View)

should fit the holes in the arm and base snugly so there's no unwanted play.

Countersink (for cap screws) or counterbore (for carriage bolts) the bottom of the sled base so the head of your cap screw or carriage bolt won't foul the surface of your table saw. Install the arm on the base with a washer and nylon-insert locknut.

Now it's time to establish miter stopping points for the arm. For that, you'll need an angle finder (see top left photo, page 40). These are inexpensive and come in a variety of sizes. Mine is 12" long. Adjust your angle finder to 45°. Set the swivel arm against the angle finder and then mark where the elongated hole on the arm is positioned on the base. If you want the jig to be really useful, repeat this process for 30° and 22.5°, as I have done, to give you the angles for six- and eight-sided frames. Now drill a 5/16" hole through the base at each of the reference marks you've made. Countersink or counterbore these holes on the underside of the jig base, too.

Setting Up the Jig

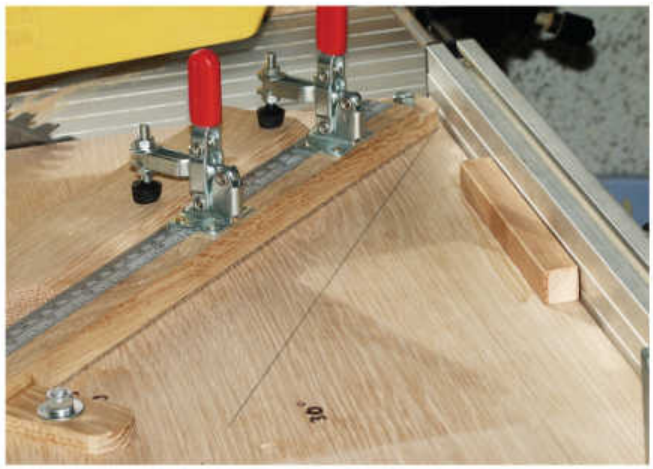
You'll notice in the opening photo of this article that my table saw has a sliding miter table feature. If your saw doesn't have one, then make a miter slot bar from a scrap of stable hardwood so your sled can be guided by the miter slot instead. The bar should slide in the

The fulcrum end of the swivel arm is stepped down into a broad rabbet to ensure that the pivot bolt can receive a washer and nut.

The same drill bit you used for boring the base and swivel arm holes can serve as a pin for aligning and clamping the parts for assembly.

Flathead wood screws driven up from the bottom added short handles to the front edge of the jig. Wax helps lubricate the screws for installation.

An angle finder, held against the edge of the jig base and swivel arm, establishes each pre-set angle setting you wish for the jig.



Once you've determined exact angle settings by making test cuts on scrap, draw lines on the jig base to mark the positions of the swivel arm.

miter slot with no extra side-to-side play. Position the bar on the sled base so the edge of the base will come to within about 1/8" of the blade. Attach the bar to the base with short countersunk flathead wood screws.

Notice also in the top right photo that I hold the sled against the fence of my sliding table with a couple of short handles attached to the front edge; if you are running this jig along a miter slot, those will be unnecessary for you.

Insert your second 5/16" cap screw or carriage bolt up through the jig base and through the elongated hole in the swivel arm at the 45° mark. Lock it into place with a washer, lock washer and a nut. Do not over tighten it. Now add a couple of toggle clamps to the top of the swivel arm to hold workpieces securely to the base, and you are ready for fine-tuning the jig.

Clamp a piece of square-edged scrap to the jig. Hold the jig against the fence of your sliding table (if applicable), and slide it forward or along the miter slot to trim the end of the scrap. Repeat this with a second piece of scrap. Then set the two mitered ends together to form a square corner, and check the test corner for accuracy with an engineer's or combination square.

If the scraps don't form an exact right angle, loosen the lock nut on the arm brace and adjust the arm's angle slightly — this is why we elongated the brace hole. Now re-cut the scraps and check them for square again. When you are satisfied that the jig is cutting a true 45° angle, trace the exact position of the swivel arm's back edge on the jig base.

Repeat this process to set up the other two angles. From now on, and if you have a sliding table on your saw, as long as its fence is set to produce an accurate right angle, the jig will automatically produce three different miters just as accurately. (If you use the jig with a miter slot bar, your jig will be accurate as well once the miter angles are determined and drawn on the jig base.)

Adding the Ruler

If you cut a lot of miters, you may want to add a ruler to the top of the swivel arm as I have done. This is how you calibrate it to the blade. Miter-cut the end of a piece of scrap to 45°. Now measure the exact length of the remaining scrap, and draw a line across the top of the swivel arm where the scrap ends.

Unscrew the toggle clamps, and trim a stick-on tape rule to the length of the swivel arm. Remove the backing and apply the tape to the swivel arm, making sure the measurement you took for the end of the scrap corresponds with the correct measurement on the tape rule. Replace the toggle clamps. This ruler will only be accurate when you are cutting 45° miters. However, it will give you quite a good guide for the other angles.

Some General Thoughts

Miters are essential any time you don't want to show end grain. Of course, the 45° setting on the jig will be useful for making square corners. The 30° and 22.5° angles are handy for producing glued-up blanks to form arches and circular frames or other items.

I have found that the jig works best when taking a fine slice from the end of workpieces. With a quality crosscut blade installed in my saw, the jig produces angle cuts to a degree of accuracy that I've never been able to achieve with my chop saw. Because of this, I tend to use my chop saw to rough-cut the pieces to length, and then finish-size them with this jig. I have also found that the second toggle clamp holds short workpieces safely for mitering.

The jig's 45° pre-set stop will make cutting square corners like these quick and accurate. You'll probably use this setting most often.

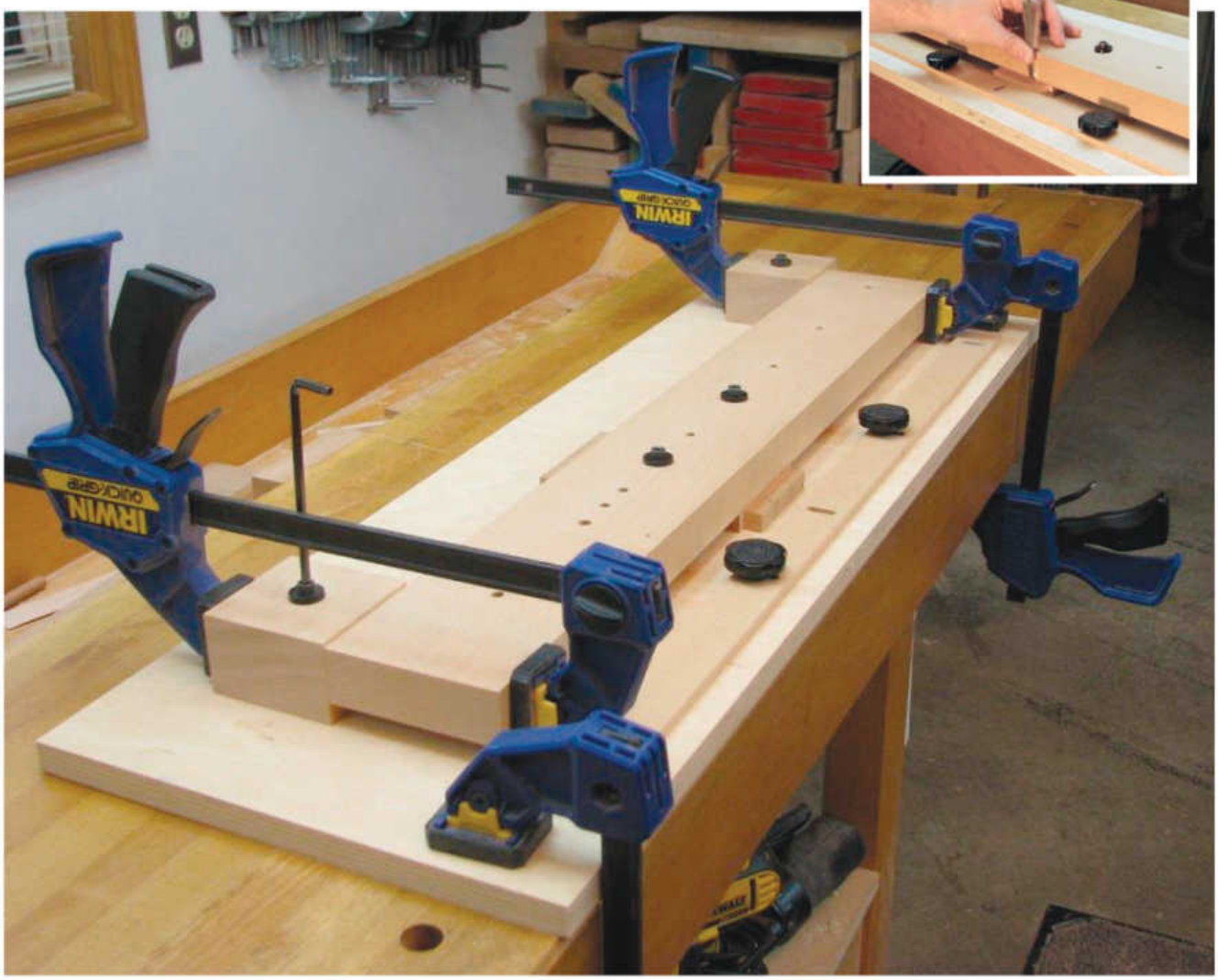
Six- and eight-sided figures can also be mitered precisely with this jig by including stops for 22.5° and 30°, which adds to its usefulness.

Don Phillips is a hobbyist woodworker and a contributor to Woodworker's Journal. *He lives in Spain.*

Dovetail Chiseling Jig

By Hendrik Varju

Chopping dovetail shoulders will be more accurate and sure with this jig. It clamps workpieces securely and provides a helpful reference fence for chiseling.



For years, I clamped a guide block to the shoulder lines of my tail and pin boards to accurately guide the back of a chisel, but clamping a guide block exactly in the right place was a bit of a challenge. Even harder was ensuring the guide block would end up the same distance from the end of the workpiece after flipping it over to chisel from the second side. So I started searching for a more reliable solution to the problem. The result was this dovetail chiseling jig, which I designed and built many years ago. I now use it regularly when cutting both through- and half-blind dovetails for my own projects and when teaching dovetailing courses to others.

When you study the *Drawing* on the next page, you'll see how simple this jig is to build from plywood and scrap. It's just a base with a long guide block on top that pins workpieces down and provides a square backup fence for a chisel. An adjustable fence in front and two backstops further immobilize workpieces during chiseling. All of the parts secure to the base with T-nuts and either cap screws or threaded knobs.

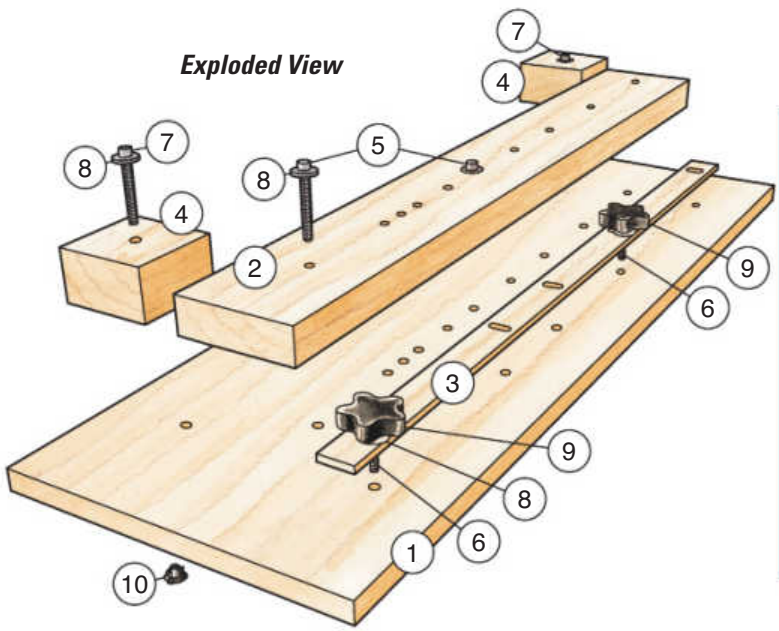
Suggestions for Building the Jig

Here are some general suggestions for building yours. The jig can accommodate thin parts or thick. For really thick parts, I use longer cap screws to hold the main guide block down. Also, the

Slotted holes in the front positioning fence enable you to move it forward or backward as needed. To make these slots, drill two end holes each and chisel away the waste in between them.

T-nuts located on the bottom of the base provide threaded fastening for the jig's cap screws and knobs. To install them, bore pilot holes first, then tap the nuts to embed their sharp cleats in the base.

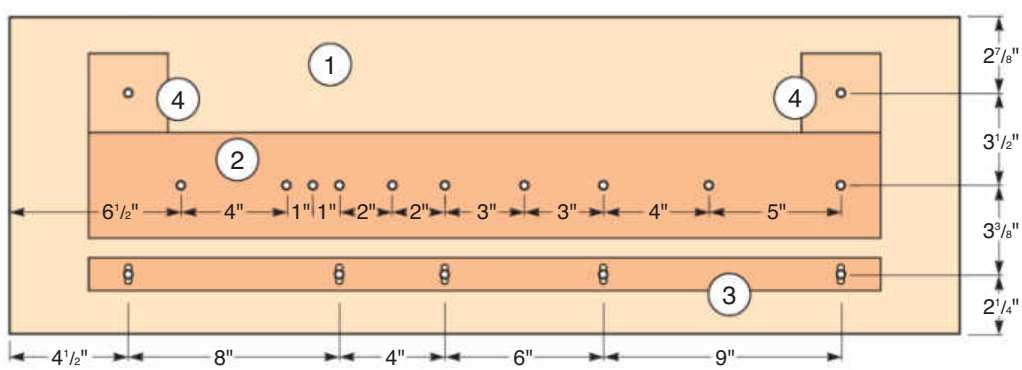
Exploded View



MATERIAL LIST

	T x W x L
1 Base (1)	3/4" x 12" x 36"
2 Guide Block (1)	1¼" x 4" x 30"
3 Front Positioning Fence (1)	1/4" x 1¼" x 30"
4 Back Stops (2)	1¾" x 3" x 3"
5 Guide Block Cap Screws (2)	1/4-20 x 2½"
6 Front Pos. Fence Cap Screws (2)	1/4-20 x 1"
7 Back Stop Cap Screws (2)	1/4-20 x 2½"
8 Plastic Washers (6)	Nylon
9 Plastic Jig Handles (2)	Press fit
10 1/4-20 T-nuts (17)	

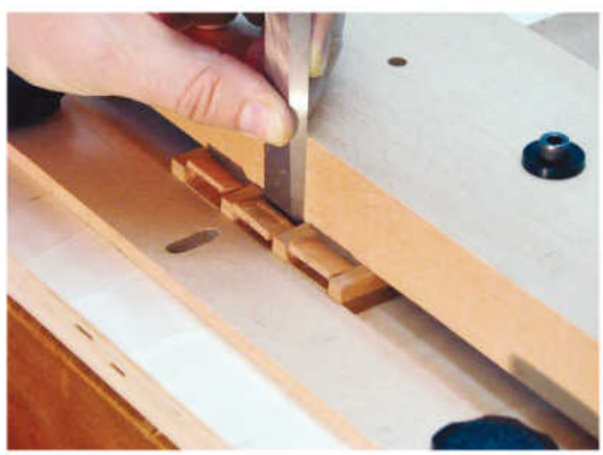
Dovetail Chiseling Jig
(Top View)



Looking for more shop jigs? You'll find our **25 Jigs and Fixtures** *CD available on the Store section of our website at* woodworkersjournal.com *or by calling 800-610-0883 (item 51729).*

Align the guide block exactly to the dovetail shoulders, and press the positioning fence against the workpiece end to trap it.

Choose pairs of reference holes in the jig that are spaced a little wider than the workpiece. Tighten the cap screws evenly.



The guide block's thickness provides a 90° reference for chiseling, and backstops behind the guide block hold its position when flipping the workpiece over to chop the other face.

jig works with narrow parts, such as for small drawers, or with panels up to 24" wide. So chopping dovetails on the panels of a blanket chest is no problem at all. I have drilled many holes for the cap screws with various spacings for a wide range of possibilities. Just choose two holes a little bit farther apart than the width of your workpiece. If they are too far apart, the guide block will bend and dig into your workpiece at the outer corners.

Tighten the guide block exactly on the shoulder line, placing a square behind the block and against one edge of the workpiece. Then secure the slotted front positioning fence tightly against the end of the panel. That way, when you flip the workpiece over, you can reposition it exactly in the same plane again. Your chisel cuts will line up beautifully from both sides.

When drilling the holes for the guide block's cap screws, size them just barely large enough for the screws to fit through without slop. If there is slop, then when you loosen them to flip the workpiece and retighten, the guide block might randomly move forward or back, or even at some slight angle. I decided to add two back stops behind the guide block to further prevent this.

After positioning the guide block on the first side of the workpiece, clamp the back stops to the guide block and then tighten their cap screws. When you flip the workpiece to work on the second side, clamp the guide block to the back stops again before tightening the cap screws. It'll end up in the same plane every time. Since the back stops never have to move forward or backward any appreciable distance, I didn't elongate the cap screw clearance holes. I just drilled the holes a little oversized.

When chopping tails or pins on the second side of the workpiece, you can move the positioning fence away or even remove it completely. This is especially helpful when cutting the bottom portion of a half-blind pin board. But be sure to secure the fence back where it started before removing the workpiece if you have other identical parts to chop. There's no point in resetting the guide block manually every time.

Hardware Option

You can use jig handles instead of cap screws if you like, but I decided that using a hex key is a small price to pay for rigidity. You'd be surprised how much force is needed to keep the guide block from moving. When you pound on a chisel, the guide block wants to move backwards from the wedging action. The back stops help prevent this.

I can't emphasize enough how useful this jig is for cutting dovetails by hand. While I still need to saw the pin and tail boards manually (I use Japanese Dozuki saws), the jig helps enormously with the chisel work. And when it comes to making sure that your chiseling is accurate as can be, there's no shame in using a rock-solid reference jig like this!

Hendrik Varju is a fine furniture designer/craftsman who provides private woodworking instruction, seminars and DVD courses. His business, Passion for Wood, is near Toronto, Canada. See www.passionforwood.com.

HARBOR FREIGHT
QUALITY TOOLS AT RIDICULOUSLY LOW PRICES

QUALITY TOOLS LOWEST PRICES EVERYDAY

SUPER COUPON
20% OFF
ANY SINGLE ITEM

Limit 1 coupon per customer per day. Save 20% on any 1 item purchased. *Cannot be used with other discount, coupon or any of the following items or brands: Inside Track Club membership, extended service plan, gift card, open box item, 3 day parking lot sale item, compressors, floor jacks, saw mills, storage cabinets, chests or carts, trailers, trenchers, welders, Admiral, Badland, CoverPro, Daytona, Diablo, Franklin, Hercules, Holt, Jupiter, Predator, Stik-Tek, StormCat, Union, Vanguard, Viking. Not valid on prior purchases. Non-transferable. Original coupon must be presented. Valid through 8/28/16.

21941119

How Does Harbor Freight Sell GREAT QUALITY Tools at the LOWEST Prices?

We have invested millions of dollars in our own state-of-the-art quality test labs and millions more in our factories, so our tools will go toe-to-toe with the top professional brands. And we can sell them for a fraction of the price because we cut out the middle man and pass the savings on to you. It's just that simple! Come visit one of our 600+ Stores Nationwide.

WOW SUPER COUPON
12" SLIDING COMPOUND DOUBLE-BEVEL MITER SAW WITH LASER GUIDE
CHICAGO ELECTRIC POWER TOOLS

Customer Rating ★★★★½

LOT 61776/61969
61970/69684 shown

SAVE $264

$134.99 $399.99 comp at $399

21944609

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
3 GALLON, 100 PSI OILLESS PANCAKE AIR COMPRESSOR
CENTRAL PNEUMATIC

LOT 95275 shown
60637/61615

SAVE 43%

Customer Rating ★★★½☆

$49.99 comp at $89

21947921

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
7 FT. 4" x 9 FT. 6" ALL PURPOSE WEATHER RESISTANT TARP
Customer Rating ★★★★★

LOT 69249/69115/69137
69129/69121/877 shown

SAVE 57%

$3.99 comp at $9.38

21952020

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
14" OSCILLATING SPINDLE SANDER
CENTRAL MACHINERY

SAVE $70

LOT 62146
95088
69257 shown

$99.99 comp at $169.99

21929435

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
350 LB. CAPACITY FOLDING SAW HORSE
CENTRAL MACHINERY

LOT 69446 shown
61979/60710

SAVE 44%

Customer Rating ★★★½☆

$9.99 comp at $17.97

21938757

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
RAPID PUMP® 3 TON LOW PROFILE HEAVY DUTY STEEL FLOOR JACK
PITTSBURGH

SAVE $85

- Weighs 73 lbs.

Customer Rating ★★★★½

LOT 61282 shown
68049/62326
62670/61253

$84.99 comp at $169.99

21943449

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

WOW SUPER COUPON
50" CLAMP AND CUT EDGE GUIDE
PITTSBURGH

Tools sold separately.

LOT 66581

$15.86

SAVE 68%

$24.99 comp at $49.95

21945516

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
16 OZ. HAMMERS WITH FIBERGLASS HANDLE
PITTSBURGH

CLAW
LOT 69006
60715/60714

RIP
LOT 47873 shown
69005/61262

SAVE 77%

YOUR CHOICE $3.99 comp at $17.99

21947961

LIMIT 8 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
12" x 33-3/8" WOOD LATHE WITH REVERSIBLE HEAD
LOT 34706

SAVE $118

$229.99 comp at $347.99

21953783

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
POWDER-FREE NITRILE GLOVES PACK OF 100
HARDY

SAVE 59%

- 5 mil thickness

SIZE	LOT
MED	68496/61363
LG	68497/61360
X-LG	68498/61359

Item 68498 shown

YOUR CHOICE $5.99 comp at $14.97

21932482

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
60 LED SOLAR SECURITY LIGHT
Bunker Hill Security

SAVE 54%

LOT 62534/69643 shown

Includes 6V, 900 mAh NiCd battery pack.

$31.99 comp at $69.99

21946993

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
27" ROLLER CABINET
Customer Rating ★★★★½

SAVE $279

LOT 61485
67421 shown

- Welded Steel Joints
- Lockable Drawers

$159.99 comp at $439.97

21949524

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
MOVER'S DOLLY
Customer Rating ★★★★★

HaulMaster

LOT 60497/93888 shown
61899/62399/63095/63096
63098/63097

- 1000 lb. capacity

SAVE 59%

$7.99 comp at $19.97

21955184

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
2 HP FIXED BASE ROUTER
Customer Rating ★★★★★

drillmaster

LOT 68341

SAVE 34%

$44.99 comp at $69

21938615

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON
60", 4 DRAWER HARDWOOD WORKBENCH
LOT 69054/93454
62603 shown

Tools sold separately.

WINDSOR DESIGN

SAVE $235

$139.99 comp at $375

21939380

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

FREE

WITH ANY PURCHASE

3-1/2" SUPER BRIGHT NINE LED ALUMINUM FLASHLIGHT

LOT 65020/69052 shown
69111/62522/62573

$4.99 VALUE

LIMIT 1 - Cannot be used with other discount, coupon or prior purchase. Coupon good at our stores, HarborFreight.com or by calling 800-423-2567. Offer good while supplies last. Shipping & Handling charges may apply if not picked up in-store. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one FREE GIFT coupon per customer per day.

21989594

SUPER COUPON

CENTRAL MACHINERY

4" x 36" BELT/ 6" DISC SANDER

Customer Rating ★★★★½

SAVE $84

LOT 62502
97181 shown

$59.99
~~$84.99~~

comp at $144.10

22030127

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

WOW SUPER COUPON

8750 PEAK/7000 RUNNING WATTS 13 HP (420 CC) GAS GENERATORS

PREDATOR GENERATORS

Customer Rating ★★★★½

LOT 68530/63086
63085/69671 shown

LOT 68525/69677
63087/63088
CALIFORNIA ONLY

SAVE $459

• 76 dB Noise Level

$539.99 ~~$599.99~~

comp at $999

21962197

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

CENTRAL MACHINERY

2 HP INDUSTRIAL 5 MICRON DUST COLLECTOR

• 70 Gallon capacity

Customer Rating ★★★★½

SAVE $210

LOT 61790/97869 shown

$169.99

comp at $379.99

21971487

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

ORBITAL HAND SANDER

drillmaster

Customer Rating ★★★½☆

LOT 40070 shown
61311/61509

SAVE 66%

$9.99

comp at $29.97

21990446

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

6.5 HP (212 CC) OHV HORIZONTAL SHAFT GAS ENGINES

PREDATOR ENGINES

SAVE $228

LOT 60363
69730/68120

LOT 68121/69727 shown
CALIFORNIA ONLY

$99.99

comp at $328

22020385

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

16" VARIABLE SPEED SCROLL SAW

SAVE $59

CENTRAL MACHINERY

LOT 62519/93012 shown

Customer Rating ★★★★½

$59.99

comp at $119

22051135

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

PNEUMATIC ADJUSTABLE ROLLER SEAT

PITTSBURGH

SAVE 50%

• 300 lb. capacity

LOT 46319 shown
61160/61896

$19.99

comp at $39.99

21966266

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

CENTRAL MACHINERY

8", 5 SPEED BENCHTOP DRILL PRESS

LOT 62520/62390/60238 shown

SAVE $66

$59.99

comp at $126.47

21973470

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

NO. 33 BENCH PLANE

WINDSOR DESIGN

Customer Rating ★★★★★

SAVE 66%

$7.99

LOT 97544

comp at $23.63

21992867

LIMIT 9 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

MIG-FLUX WELDING CART

CENTRAL MACHINERY WELDING

SAVE 50%

Welder and accessories sold separately.

LOT 69340 shown
60790/90305/61316

$34.99

comp at $69.99

22022080

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

DOVETAIL JIG

WINDSOR DESIGN

LOT 34102

SAVE 51%

$27.99

comp at $57.98

22024186

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

ELECTRIC CHAIN SAW SHARPENER

CHICAGO ELECTRIC POWER TOOLS

Customer Rating ★★★★★

LOT 61613
68221 shown

4-1/4" grinding wheel included.

SAVE 44%

$27.99

comp at $49.99

21969234

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

ALUMINUM OXIDE SANDING SPONGES - PACK OF 10

Lifetime CARBIDE

SAVE 78%

YOUR CHOICE $3.99

COARSE LOT 46751
MEDIUM LOT 46752
FINE LOT 46753

comp at $18.27

21975663

LIMIT 8 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

12,000 LB. ELECTRIC WINCH WITH REMOTE CONTROL AND AUTOMATIC BRAKE

SAVE $433

LOT 61256/60813
61889/68142 shown

BADLAND

$319.99

comp at $752.99

22012704

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

SUPER COUPON

CEN-TECH

AUTOMATIC BATTERY FLOAT CHARGER

SAVE 82%

Customer Rating ★★★★½

LOT 42292 shown
69594/69955

$5.99

comp at $34.99

22025257

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 8/28/16. Limit one coupon per customer per day.

• 100% Satisfaction Guaranteed • No Hassle Return Policy
• Over 30 Million Satisfied Customers • Lifetime Warranty On All Hand Tools

• 600+ Stores Nationwide
• HarborFreight.com 800-423-2567

Six of Our Favorite Jigs, Up-close

By Woodworker's Journal Staff

"Store-bought" jigs can improve accuracy, add safety, expand the versatility of tools and much more. For your consideration, here are a half-dozen your Journal staff really like!

Sooner or later, woodworking involves using jigs of one sort or another. They can make machining tasks safer, add accuracy to joint-making or other repetitive tasks and even help make tools more versatile. Want to cut perfect inlays with your router or turn a table saw into a molding machine? A specialized jig can make that happen.

We woodworkers are pretty inventive, and most of us are quite frugal, too. We make many of the jigs we need for little or no cost. But sometimes a prefabricated jig just makes sense to buy. It's a better "mousetrap" than we can make ourselves, right from the start, and it saves the time and effort of designing and building the jig before you can even use it to build a project.

You might not be shopping for a particular jig now, but someday these half-dozen favorites of ours could be just the ticket when needed. They've proven themselves in our shops, and we'd like to share them with you here.

Chris Marshall

Drawer Pull JIG IT Template and Center Punch

Maybe it's the uniformity and repetition that goes along with building cabinets and drawers, but when I make them, I want the process to be precise and efficient. That's why having a couple of ready-made cabinet-building jigs is so helpful. Here are two from Rockler I use over and over again.

Cabinets need adjustable shelves, and that means rows of shelf-pin holes to drill. It's a mundane job, and they must align perfectly with one another, or shelves will rock back and forth on their pins.

The JIG IT® Shelving Jig simplifies this effort while ensuring that shelf-pin hole placement is spot-on. Its clear, 20"-long acrylic baseplate features two rows of holes, spaced 32 mm apart, lengthwise. You can set the rows either 1 7/16" (37 mm) or 2½" (64 mm) back from the cabinet edges by screwing the jig's black edge guide to one side of the baseplate or the other. (The 2½" offset will keep holes clear of the mounting plates of cup hinges.)

Rockler also provides a spring-loaded, self-centering bit with the jig: you choose either 1/4" or 5 mm bit sizes. The bit stows conveniently in one of two hinged compartments on the jig so you can't misplace it.

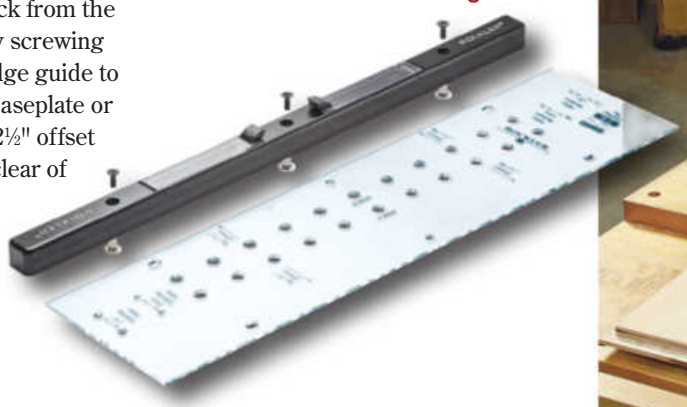
Cabinet projects also call for door and drawer pull hardware. Pulls have different screw spacings, and they, too, need to line up right. For that step, Rockler's Drawer Pull JIG IT is pretty nifty: its acrylic baseplate provides pairs of drilling guides for pulls with six different screw spacings: 2½", 3", 3½", 3¾", 4" and 96 mm. Just align the wooden edge guide to index lines on the baseplate to establish your desired offset, lock the setting with the included knobs, and the jig is ready. It even comes with a spring-loaded punch that fits in the baseplate holes to mark drilling centerpoints.

Neither of these jigs break the bank, and they're mighty handy! I wouldn't trade mine.

www.woodworkersjournal.com
MORE ON THE WEB

VIDEO For a video on using the Drawer Pull JIG IT, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

JIG IT Shelving Jig with Self-centering Bit



Rob Johnstone

Micro Jig GRR-RIPPER Advanced 3D Pushblock System GR-200

Safely ripping stock on a table saw is about as basic and as important a task as you can do in your workshop. Nearly all woodworking projects of any scope end up at the table saw pretty quickly. And if you think about it for a minute, you'll recognize that there are many different types of rip cuts with varying degrees of difficulty.

That's why one of my go-to shop products is the GRR-RIPPER®. Think of it as a high-tech push block on steriods. I use the GRR-RIPPER for ripping, of course, but it is useful in crosscutting and in operations like rabbetting and dadoing as well. Its versatility makes it useful on a router table and band saw, too. I find it most useful for ripping when I am switching back and forth between table saw techniques that require that I remove the blade guard.

I have heard some folks question the size of the GRR-RIPPER (too large), but for me it is a plus in every way. It has sufficient area to grab the wood securely, and it is big enough that I don't misplace it like my smaller shop-made push sticks.

The GRR-RIPPER is good for ripping narrow stock, but when it gets down to 1/8" or narrower, that is when I reach for my other favorite table saw accessory: the Rockler Thin Rip Tablesaw Jig.

www.woodworkersjournal.com
MORE ON THE WEB

VIDEO For a video demonstrating the use of the Rockler Thin Rip Tablesaw Jig, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

Rockler Thin Rip Tablesaw Jig

This reasonably priced jig allows you to rip thin strips of wood on the outside of the table saw blade, so there is no way the stock can get caught between the fence and the saw blade.

It is easy to set up, produces repeatable, identical strips of wood and can even be used with your table saw guard in place.

If you are cutting lipping for edging plywood or thin strips for inlay, this little jig is just the ticket. It sets up and locks in your miter saw slot quickly and easily.

Both of these jigs get good use in my shop — they add accuracy and safety.

Continues on page 50 ...

Kimberly McNeelan

Rockler Cove Cutting Table Saw Jig

Coves are cool, and cutting their curves into a flat plane on the table saw is very exciting! With Rockler's Cove Cutting Table Saw Jig, you can safely create a beautiful cove in just minutes — as long as you creep up on the finishing pass.

The jig can take wood up to 7" wide and 1½" thick. I've found myself using it as inspiration for coming up with new uses for coves. Frames are a classic project where this jig comes in handy, but coves can add aesthetic interest to many projects, including trim for your home, mantles, trays, etc. (This year everyone just might be getting olive trays!)

What I really like about the Cove Cutting Table Saw Jig is that you don't have to use regular clamps to hold the jig to the table saw. It's secured to the saw's table by tightening all the knobs very tightly, in the saw's miter slots. (You should check periodically before and during use to make sure they're still tight, which is part of using it safely.) Of course, if I was going to be doing a production run of coves, I think I might still use a few clamps, just to be on the extra-safe side.

Dowelmax Classic Doweling Jig

When I think about why I like my other favorite, the Dowelmax Classic Doweling Jig, the words strong, quick, precise and easy all come to mind. The Dowelmax jig allows you to quickly and easily make dowel joints that are a replacement for a traditional mortise-and-tenon, giving you options for joining wood that are nearly endless.

I first used the Dowelmax to make a picture frame. Usually I use splines in my miters, but I didn't want to see the splines on this particular frame. The Dowelmax allowed me to not use splines and keep great structural integrity in the joint. The jig will tackle many other projects, too.

One accessory that I find particularly useful is the adjustable distance guide. This simple addition references from one hole to another precisely and quickly. The Dowelmax also has spacers to allow you to use different thicknesses of wood or to drill multiple rows of holes. The base model alone allows for many setups, but the added accessories take this jig to a new level of versatility for many more projects.

These jigs sure expand my project possibilities!

Apps for Woodworkers

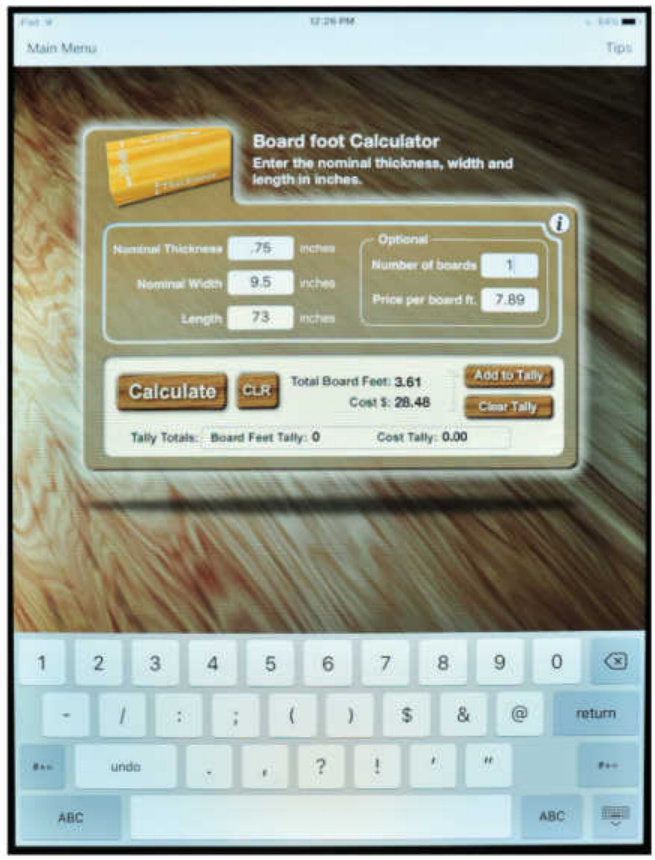
By Sandor Nagyszalanczy

Need to solve a specific woodworking problem? In all likelihood, these days, there's an app for that.

Unlike complex computer CAD and design programs oriented towards professional cabinet and furniture makers, woodworking applications (aka "apps") are small, specialized programs designed to help even small shop tinkerers and DIYers accomplish specific tasks. The right app will help you quickly figure out the number of board feet in an oak plank, determine the miter and bevel angles needed to cut a crown molding corner, calculate the least wasteful way to cut parts from a sheet of plywood, measure the angle of a rafter or help you level a kitchen cabinet.

Trying to I.D. a tree? The Leafsnap app can identify the species based on a photo you upload of a leaf.

Most apps are designed to work with specific kinds of smartphones and tablets. iPhones and iPads use Apple's iOS operating system (OS), while various other brands of smartphones and tablets (Samsung, Asus, LG, etc.) run on the Android OS. You'll find iOS apps on the Internet at *https://itunes.apple.com* and Android apps at *https://play.google.com*; simply search the name of the app. Many apps are free, although some work only for a limited trial period, after which you must purchase them. Woodworkers who use regular laptop or desktop



The WoodMasterHD app can calculate board footage totals, as well as fractions and proportions.

computers aren't out of luck either: there's a slew of app-like programs available on the Internet. Some are designed to be used directly online with any device that has a web connection. Others must be downloaded and run from a computer.

What follows are a variety of woodworking and DIY apps I've used for various home and shop projects. The list is by no means exhaustive; new ones seem to spring up every day. I encourage you to search online to find apps to suit your needs.

Tree, Wood Identification

Ever wonder what kind of tree your neighbor just cut down (perhaps because you're thinking of turning a bowl out of one of the logs)? Leafsnap (free for iOS) is a tree field guide with a browsable collection of photographs of leaves, flowers, bark, etc. of 185 Northeastern and Canadian species. The program's coolest feature is leaf recognition: Take a photo of a mystery leaf with your device, and the app uses visual recognition software to identify it!

More limited in scope but still useful, The American Species Guide (free for iOS or Android) has useful information about 20 of the most popular American hardwood species, including their appearance, physical and working properties (machining, screwing, gluing and finishing), as well as the typical applications of each wood.

Woodworking Calculators

These multifunction apps can handle many everyday woodshop calculating tasks with aplomb. WoodMasterHD ($7.99 for iOS) has calculators for board footage, fractional measures, proportions and golden ratios, as well as charts of nail and screw sizes, joint type charts and more. The Handyman Calculator ($4.99 for Android) includes calculators for tallying board feet, trigonometric functions, generating cutlists, converting feet and inches, as well as dozens of other functions oriented towards general carpentry.

If all you need is an app for tallying boards, the Board Feet Calculator app ($0.99 for iOS) quickly adds up total board footage and cost based on the lumber's price per board foot. You can also use the University of Missouri's free online board foot calculator here: *http://extension.missouri.edu/scripts/explore/G05506.asp*.

Another great online resource, Calculatorsoup (*http://www.calculatorsoup.com/calculators/*) has free-to-use calculators for common conversions (feet to inches, fractions to decimals, etc.), geometry and trigonometry (finding perimeter or area of circles, volume of shapes, etc.) and much more.

www.woodworkersjournal.com
MORE ON THE WEB

VIDEO For a video of the author demonstrating the use of woodworking apps, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

Plug info into a crown molding angle calculator, and it produces the required miter and bevel saw settings.

Technology And Woodworking continued

With sheet goods and project part dimensions, the Carpenter Pro will give you an optimized layout.

Figuring out how to cut crown molding corners can be maddening. Fortunately, the Crown Molding Miter and Bevel Finder, a free online calculator (*http://www.construction-resource.com/calculators/crown-molding.php*) makes the process much easier. You simply plug in the spring angle of the crown molding you're using, and the angle of the walls, and it calculates the miter and bevel settings you'll need.

Motion sensitive components enable apps like Spirit Level Gold to check for plumb or level.

Design Apps

Why brave complicated CAD programs when The Woodshop Calculator (online, for $9.99 at *woodshopcalculator.com*) helps you design the doors for just about any cabinet project? After choosing from seven different door styles, including arch and cathedral, you enter basic door information and dimensions and the calculator generates a complete plan, including a detailed cut list ready to print out. Want to build louvered shutters for your bay windows? You'll find an online Shutter Design Wizard here: *http://www.rockler.com/shutter*. Input a few dimensions, and the app creates a printable plan complete with a parts list and detailed building instructions.

Panel Cutout Optimizers

Plywood and lumber are so expensive these days, it's worth taking the time to optimize your cutout plan to help avoid miscuts and get the most out of every sheet and board. With Carpenter Pro ($14.99 for iOS), you input the dimensions of the sheet goods and all required parts, then the app generates an optimized layout scheme. You can identify parts on the layout by name, dimensions or both. Online users can download Cutlist400, a basic but functional cutout optimizer program, here: *http://www.delphiforfun.org/programs/cutlist.htm*.

Measuring Tools

Modern tablets and smartphones contain special motion sensitive components that enable them to measure angles and distances. Basic apps, like the Spirit Level Gold (free for iOS), display an image of a bubble level. Simply set your device on the edge of a photo frame or surface of a wall shelf to check it for plumb or level. Other apps feature dedicated goniometers that measure inclined surfaces with surprising precision. The Anglemeter (free for iOS) takes things a step further, measuring the angle of walls, cabinet sides, countertops, etc. either by placing the device itself on the surface, or by aligning a live image from the device's built-in camera with an on-screen cursor. In addition to angle measuring and protractor functions, the Flying Ruler app ($1.99 for iOS) actually measures distances — you move the device along the length of the part or the distance between surfaces. Accuracy is a bit dodgy, but it's usually good enough for a basic estimation.

Family-made Adirondack

By Chris Marshall

There's nothing quite like an Adirondack chair to while away some lazy time outside on a summer day. Its countoured back and seat make this chair comfortable to sit in but still very easy to make. With some help, my 15-year-old built this chair in just two long shop days.

The trick to tackling the curved seat frame and armrest shapes is to start by making a pair of plywood or hardboard templates. They'll help you trace and duplicate pairs of matching chair parts, and you can save the templates for re-use. Make the template patterns by first drawing a 1" x 1" grid on your template pieces, then lay out the shapes with dots that match the gridded drawings on page 58. Draw the shapes, dot-to-dot style, cut them out and sand the templates to refine their edges. They're worth the fuss!

Use a thin strip of wood, a flexible ruler or a scrap of plastic laminate, as we did, to connect the dots on your templates.

Making the Seat Framework

Adirondack chairs often weather all four seasons outside, so it makes sense to build them from outdoor-tough wood. Cypress is readily available in our area, and it's an excellent option because it both resists rot and repels wood-boring insects. Other good alternatives are cedar, redwood, mahogany, white oak or teak. You could even build your chair from ordinary pine lumber, but be sure to paint it. Pine won't stand up well to Mother Nature unless it's protected.

Regardless of which wood you choose, gather enough 3/4"-thick stock for all of the chair parts, according to the *Material List* on page 58. Trace the two seat frame pieces with your template, and cut them just outside the layout lines with a jigsaw. Template-rout the seat frames to final shape, either at the router table or with a handheld router (see

After cutting the seat frame and arm templates to rough size, refine their edges with a spindle sander or sanding drums in a drill press.

Template Routing

VIDEO ONLINE VIDEO!

Template routing is one of woodworking's primary ways of duplicating shapes, and it's handy when you need to replicate parts with compound curves, like these seat frames. Use your rigid template to trace the shape onto your workpiece blank, then cut it out about 1/16" outside of the traced lines. Adhere the template to the wood with carpet tape. Now, the pilot bearing on the end of a flush trim bit (see inset) can follow the shape of the template precisely while the cutter trims off the excess wood, producing a perfectly matched part. It's a technique you can use often for all sorts of applications.

sidebar, this page). Then remove the template, and clean off any sticky tape residue with acetone or mineral spirits. File the lower back frame notches to change them from a tight curve (where the router bit won't reach) to a square corner instead.

Trace two seat frame workpieces to shape, using your template as a pattern, then cut them to rough size with a jigsaw.

Now, mark the outside faces of the seat boards with pairs of angled lines to set the front leg locations, while the parts can still be laid flat (see photo, right). The front edge of the front leg is 4" from the seat frame's front end (see *Drawing*).

Rip and crosscut the back stretcher and the 11 seat slats to size. Use a 1/4"-radius roundover bit in your router or router table to remove the top edges, ends and corners of the seat slats. This will be a big help in reducing splinters!

Time for some assembly. Fasten the back stretcher between the seat frames, 6¾" in from their back ends, and attach the frontmost seat slat to hold the seat frame assembly together. Use 2" screws driven into counterbored pilot holes to assemble these parts. (Note: We chose to counterbore all of the screw holes in order to fill them with wood plugs, later, to hide the screw heads. See *sidebar*, page 62.) Install the remaining 10 seat slats, spacing them about 3/8" apart. Here's a tip: 3/8"-diameter dowels set between the slats make handy spacers.

With the seat framework completed, cut the front and back legs to size, as well as the front stretcher, then miter-cut the top ends of the back legs to a 33° angle.

Fasten the front stretcher between the front legs with counterbored screws so its top edge is 6¾" up from the bottoms of the legs. Center the stretcher on the width of the legs. Now stand the front leg assembly on your bench, and fit the seat framework down between the legs, resting it on the front stretcher. Align the legs with the layout lines you drew previously on the seat frames, and clamp the parts together.

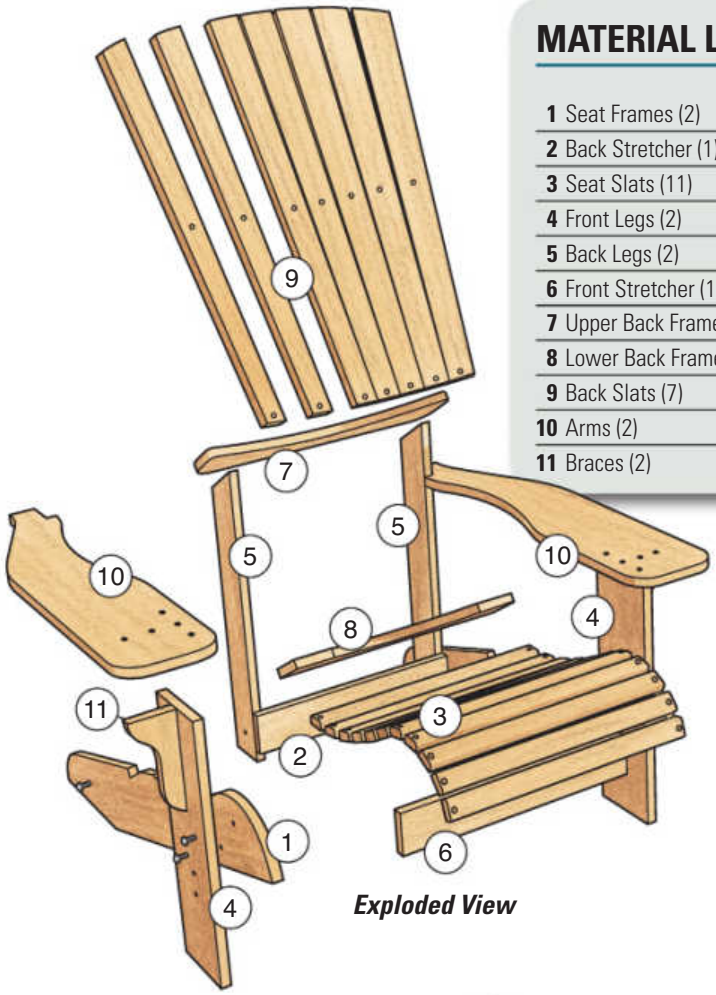
Lay out and drill a pair of 1/4" pilot holes through each front leg and seat frame for 2"-long carriage bolts that will secure these parts. Tap the bolts into place, and use a washer, lock washer and nut to complete the front leg joints.

Install the back legs the same way

Mark pairs of layout lines for the front leg locations on the seat frames. A miter gauge set to 72° makes a good layout tool. File the lower back frame corners square, too.

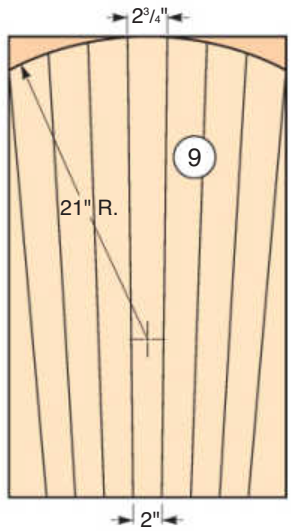
MATERIAL LIST

		T x W x L
1	Seat Frames (2)	3/4" x 5½" x 38½"
2	Back Stretcher (1)	3/4" x 3½" x 18½"
3	Seat Slats (11)	3/4" x 1½" x 20"
4	Front Legs (2)	3/4" x 5½" x 20"
5	Back Legs (2)	3/4" x 3½" x 25½"
6	Front Stretcher (1)	3/4" x 3½" x 20"
7	Upper Back Frame (1)	3/4" x 5" x 22"
8	Lower Back Frame (1)	3/4" x 3½" x 20"
9	Back Slats (7)	3/4" x 2¾" x 32"
10	Arms (2)	3/4" x 7¼" x 31"
11	Braces (2)	3/4" x 3½" x 7½"

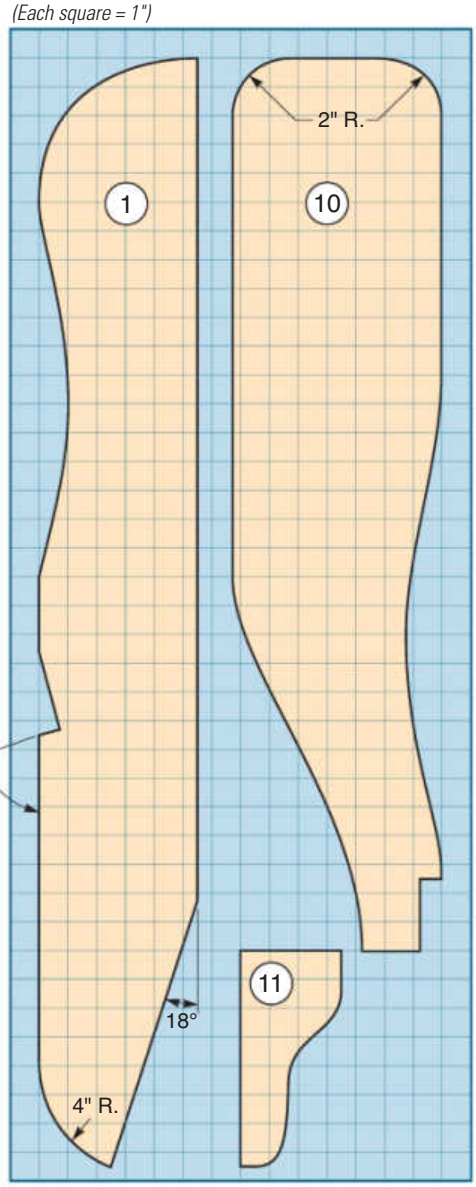


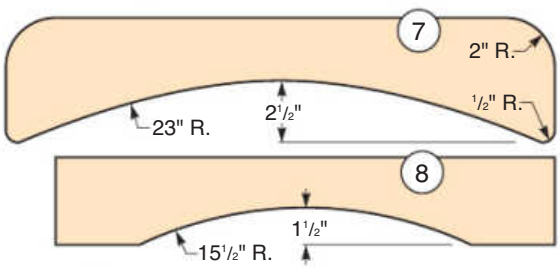
Exploded View

Slat Layout
(Front View)



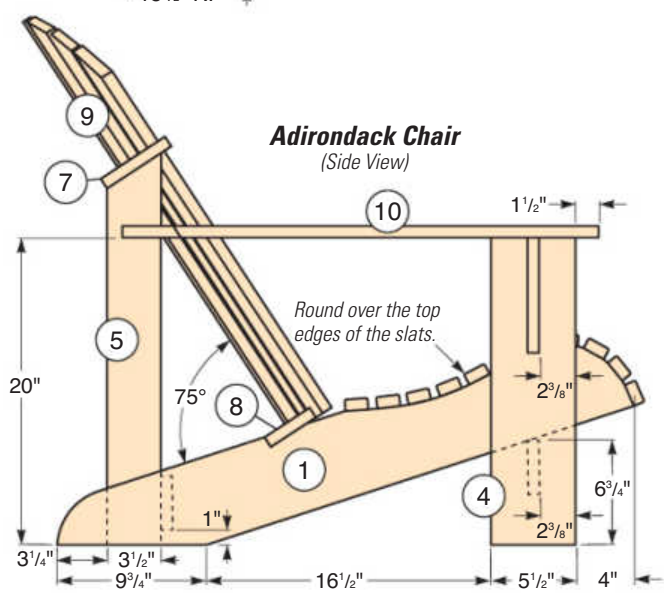
Patterns
(Each square = 1")





Upper Back Frame
(Top View)

Lower Back Frame
(Top View)



Adirondack Chair
(Side View)

Continues on page 60 ...

www.woodworkersjournal.com
MORE ON THE WEB

VIDEO For videos on the skills of template routing and making wood plugs, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

Space the 11 seat slats evenly apart with 3/8" dowels, then fasten them to the seat frames with a single counterbored screw at each joint.

Attach the back legs to the seat frames with single carriage bolts, washers and nuts. Orient the pointed ends of the legs toward the chair back.

and so the sharp tips at the tops of these two legs point inward toward the chair back. The back legs should butt against the back face of the back stretcher. Use single 2" carriage bolts for these joints.

Adding the Back

Start building the chair back by ripping and crosscutting a pair of workpieces for the upper and lower back frames. For the upper back frame, use a compass to round its back corners with 2" radii and the front corners with 1/2" radii. Then draw a 23"-radius curve along the front edge, centered on the part length, with an adjustable trammel. The deepest sweep of this curve should be 2½". Draw a broad curve along the front of the lower back frame, too, but reset the trammel for a 15½"-radius instead. The curve should be 1½" deep in the middle.

Cut all the back frame curves with a jigsaw, and sand the edges and faces smooth. With that done, attach the upper and lower back frames to the chair with counterbored 2" screws. Align the front curved edge of the upper back frame piece with the front inside corners of the back legs, and center it side to side before driving the screws.

Next, create a 32"-long tapered template for the back slats, starting with a piece of 2¾"-wide template material. Reduce this width to 2" at the template's bottom end. Once it's made, trace the template onto seven back slat blanks, and jigsaw the slats to rough shape. Template-rout them to final size, just as you did for the seat frames.

The top ends of the slats need to be shaped into a gentle, 21"-radius curve. So, arrange and clamp them together on your workbench, and draw the top curve with the trammel. Now, mark their bottom ends with a straight line that's aligned with the bottom edge of the center slat. Trim the bottom ends of the slats along this straight layout line, and cut the top curve to shape. Sand the ends smooth. At this point, take a few minutes to remove all the sharp edges and ends from the slats with a 1/4" roundover bit in your router. Sand the roundovers to blend them in.

Trammel points, mounted to a dowel, work like a compass to draw large radii onto the upper and lower back frames and, later, the back slats.

To attach the back slats to the chair, start with the middle slat. Center it in the curves of the upper and lower back frames, and align its bottom edge flush with the bottom face of the lower back frame. (We found it helpful to clamp a board to the bottom face of the lower back frame to serve as a "shelf" and alignment aid for all the back slats.) Attach the slat with a single counterbored screw to the upper and lower frames.

Once the back slats are template-routed to their tapered shape, clamp them together, draw the top curve, and cut it out with a jigsaw.

Go ahead and position the rest of the back slats. Space them 3/8" apart at the upper back frame but only about 1/8" apart at the lower back frame. We tacked the slats in place with a 23-gauge pin nail at each joint to hold them temporarily (18-gauge brad nails would be fine, too). Tacking provides a helpful "third" hand, especially if you don't have a daughter to help you. Mark the slats for screws and drive them in, two screws per slat. You might want to remove the rearmost seat slat for this, in order to gain better access for driving the bottom slat screws.

Making and Installing the Arms

All that's left to do on your chair is to make and install the arms and their supportive braces. Use your arm template

Continues on page 62 ...

SATAjet 1000 B

The Versatile One!

SATA
German Engineering

Carpenters and wood finishers achieve high gloss surfaces with SATA high performance spray guns. They have been designed to allow perfect application of modern stains, glazes, single-stage materials, post and pre-cat clear coats, meeting the highest demands in terms of color match, brilliance, color effects, material distribution and gloss level.

- **Easily handles Maple stains without blotching**
- **Low pressures help to get even coverage in recesses or on raised panel doors**
- **SATA RPS cups, disposable vented cups, for mixing, spraying and storage, deliver even material distribution**

Optional

SATA RPS Cups

Rapid Preparation System

Nozzle size	HVLP	–	–	–	1.4	–	1.7	–	1.9	–	2.1	–	–	–	–	–
	RP	0.8	1.0	1.3	–	1.6	–	1.8	–	2.0	–	2.5	3.0	4.0	5.0	1.6 D*
Spray gun with 0.6 l QCC PVC reusable cup, without swivel joint		–	–	–	149377	–	149385	–	149393	–	149401	–	–	–	–	–
		151183	151191	149302	–	149310	–	150391	–	149328	–	151209	151217	154161	–	164962
Spray gun with 0.6 l QCC PVC reusable cup, with swivel joint		–	–	–	157966	–	157974	–	157982	–	157990	–	–	–	–	–
		157875	157883	157891	–	157909	–	157917	–	157925	–	157933	157941	157958	–	–
Nozzle Set		–	–	–	149195	–	149203	–	149211	–	149229	–	–	–	–	–
		151316	151324	149161	–	149179	–	150417	–	149187	–	151332	151340	154187	154195	164970

DanAm® *The exclusive independent distributor of SATA products in the US and Puerto Rico*

Phone: 800-533-8016 | E-mail: satajet@satausa.com | www.satausa.com

Rest the back slats on a temporary clamped "shelf" board, and fan them out evenly on the back frames before tacking them in place. Then attach the slats with two screws each.

to trace two arm shapes onto wide stock, and cut them out. Template-rout them to final size.

Ease the sharp edges around the arms with a router and roundover bit, but keep the edges where the arms notch around the back legs. Sand the arms and their roundovers smooth.

You're ready to position the arms on the legs. Align their bottom faces to a layout line on the back legs drawn 20" up from their bottoms. The inside edges of the arms should overhang the inside faces of the front legs by 3/4" to 1".

Drive two counterbored 2" screws down through the arms and into the front legs to attach them. Then, carefully drill across the notched back ends of the arms and through the back legs with a long 1/4" bit. Center a single hole on the lengths of the arm notches. Tap a 3½" carriage bolt through it, and secure with a washer, lock washer and a nut.

A 1/4" roundover bit in a handheld router removes the sharp edges around the perimeter of the arms. Don't round over the edges in the leg notch areas.

Now add a pear-shaped brace beneath each arm. Make these, starting with a plywood template to establish the shape. Once you've rounded over the edges and sanded them smooth, install the braces with three counterbored screws: one down through the arms and two through the legs, driven into the braces.

Consider an Eye-Catching Finish!

Plug all the screw holes, and finish the chair with exterior paint or stain. Adirondack chairs are often painted white or in vibrant primary and pastel colors. If you've used an exterior-tough wood, you could also just leave the wood bare and it will weather to a silvery gray color.

Wood plugs hide the screw heads. Install them with waterproof glue, and trim off the excess with a flush-cutting saw.

Here's a great chance to decorate in a bright paint color! We used an all-in-one exterior primer/paint in a satin sheen.

Making Wood Plugs

VIDEO ONLINE VIDEO!

Wood plugs are the best way to hide screw heads. They won't shrink and fall out like wood putty can, and when made from scraps of the project's wood, plugs make screw locations nearly vanish, even under a clear finish. A steel, tapered plug cutter creates them quickly and easily on a drill press. Once the plugs are bored into a piece of scrap wood, break them free with a screwdriver. Then push or tap the tapered end into the screw-head hole with a dab of glue.

What's In Store

A First in Table Saws

SKILSAW SPT70WT-22

Contact Information

Affinity Tool Works (Sjöbergs)
248-588-0395

Rockler
800-279-4441

ShopBot Tools
888-680-4466

SKILSAW
877-754-5999

Titebond
800-669-4583

Triton
855-227-3478

The **SKILSAW**® *SPT70WT-22* is the first 10" table saw with worm drive. Drawing on the company's heritage with worm drive handheld saws, SKILSAW has added to this 15-amp, 120-volt saw worm drive gearing and a Dual-field™ motor with dual copper windings that power and cool the motor. The SPT70WT-22's rip capacity is 25", for cutting sheets of plywood in half, and its depth of cut is 3½", for quick cuts of 4x material. The saw has an all-metal roll cage design and a die-cast aluminum tabletop. It weighs in at 49 pounds and comes with a 10", 30-tooth DIABLO® carbide blade, miter gauge and self-aligning rip fence. Suggested price for the SPT70WT-22 10" Worm Drive Table Saw is $379.

Triton TWX7 Workcentre

A newly redesigned incarnation of the Australian **Triton** *TWX7 Workcentre* is now available for the first time in the U.S. The extruded aluminum frame can support workloads of up to 330 pounds and provides a 35½" high work surface. It comes with a removable MDF Clamping Table Module with bench dog holes. Various other modules can be installed on the TWX7 Workcentre for additional uses: a Router Table Module, Contractor Saw Module and Project Saw Module. Side and Outfeed Supports are also available, as is a Rugged Transit Kit that makes the Workcentre more portable for jobsites. There is a built-in isolated main switch connector on the Workcentre for attaching power tools, as well as a knee-off On/Off button. The Workcentre can fold down — even with modules attached — and fit through standard doorways. The price for the TWX7 Workcentre is $446, with additional modules at varying prices.

The *Compact Router Sub-base with Handles* from **Rockler Woodworking and Hardware** has a 6"-diameter plate plus ergonomic handles that improve control and stability when using a compact router's standard fixed base. The plate is made from 1/4"-thick clear acrylic for visibility. Its stepped center opening fits standard guide bushing inserts for template or pattern routing, and the plate is predrilled for quick mounting to the fixed bases of popular Bosch, DeWALT and PORTER-CABLE compact routers. The Compact Router Sub-base with Handles (item 59811) is priced at $29.99.

Continues on page 66...

Rockler Compact Router Sub-base with Handles

Get Your Premium Content Now!

As a subscriber to the Woodworker's Journal, you have access to some of the most in-depth and powerful woodworking articles and videos on the Internet.

Q. How do I get it?

A. Simply go to *woodworkersjournal.com* and click on the "Premium Content" tab on the gray navigation bar near the top of the page.

Q. Is that all?

A. Almost … now you just need to sign in. You can do that with your subscription number (that you will find on the mailing label of your magazine). Just type in your subscription number and zip code and you're done! *(If you subscribe to the digital edition, your email address will be your log-in.)*

*This is **your** account number.* It's printed on the mailing label that's attached to the cover of every issue.

What's In Store continued

Titebond Quick & Thick Glue

Titebond's new *Quick & Thick Glue* is a PVA glue meant for multiple surfaces: it bonds wood like other Titebond glues but will also bond ceramics, stone, glass, fabric, leather and other porous and semi-porous materials. The glue has a gel consistency that is three times thicker than traditional PVA wood glues, which prevents dripping when applied to vertical surfaces and adds flexibility to glued parts prone to movement. Quick & Thick's open time is three to five minutes; set time is 15 minutes. The glue will bridge gaps up to about 1/32" and features water cleanup. Quick & Thick is packaged in 8 oz. bottles and is priced at about $3.99.

Sjöbergs Smart Workstation Pro Vise

The *Smart Workstation Pro Vise Workbench Top (SJO-33309)* from **Sjöbergs** is a portable 1⅝"-thick, solid European beech top that can be added or attached with clamps to almost any stable surface to create an instant woodworking vise, complete with a short row of bench dog holes. The included bench dogs feature flat faces, which pivot to align themselves with odd-shaped objects and provide the option of using the Workstation Pro Vise as a carving vise. The Workstation Pro Vise can mount with clamps or with bolts. Jaws open to 4⅝". The Smart Workstation Pro Vise is priced at $229.50.

Rockler Drawer Front Installation Clamps

Rockler's *Drawer Front Installation Clamps* are designed to make it easier to align and attach drawer fronts to their boxes. Sold in left/right pairs, the clamps are made of steel and feature threaded bolts with knob handles on one end and nylon-capped clamping pads on the other end to provide strong clamping pressure without damaging the drawer box and front. Micro-adjustable stops, positioned at the ends of the drawer front, enable you to shift it left or right in small increments to center it correctly on the box. The clamps can handle drawer box side thicknesses up to 1⅛" and drawer faces up to 1", with up to 1¾" overlay. The clamps (item 54804) are priced at $39.99

The *Desktop MAX CNC router* from **ShopBot® Tools** was designed in response to customer requests for a CNC that could work with bigger pieces of material. The 24" x 36" work bed of the Desktop MAX is twice the size of that of its mid-size counterpart. According to lead engineer Kevin Putvin, "Larger items such as a guitar neck will fit easily onto the work bed." The tool also has a removable bed. The Desktop MAX runs on standard 120-volt household power. It has an XYZ movement of 38" x 25" x 5½" and a cutting volume of 36" x 24" x 3½". Total weight, with aluminum deck and spindle, is 171 pounds, while the cut speed is four inches per second. The Desktop MAX is priced at $9,000.

ShopBot Tools Desktop MAX

Woodworking Tools & Supplies Index



June 2016

For product information in the blink of an eye, visit www.woodworkersjournal.com *and click on "Woodworker's Marketplace" under the Tools & Supplies tab.*

ADVERTISER	Page No.	Web Address
1-800-BunkBed	**23**	*www.1800bunkbed.com/wj*
3M	**15**	*www.3m.com/sanding*
American Fabric Filter Co.	**55**	*www.americanfabricfilter.com*
Armor Crafts	**73**	*www.armorcrafts.com*
Armor Tool	**59**	*www.armor-tool.com*
Axiom Tool Group, LLC	**51**	*www.axiomprecision.com*
Badger Hardwoods of WI, Ltd.	**73**	*www.badgerwood.com*
Baileigh Industrial, Inc.	**63**	*www.baileigh.com*
Beall Tool Company	**23, 63**	*www.bealltool.com*
Calculated Industries	**17**	*www.calculated.com*
CMT USA Inc.	**73**	*www.cmtusa.com*
DR Power Equipment	**63, 71**	*www.drpower.com*
Epilog Laser	**9, 55**	*www.epiloglaser.com/wwj*
Forrest Manufacturing Company	**55**	*www.forrestblades.com*
Freud	**2**	*www.freudtools.com*
Fuji Spray Equipment	**15**	*www.fujispray.com*
General Finishes	**51**	*www.generalfinishes.com*
General International	**19**	*www.general.ca*
Gorilla Glue	**15**	*www.gorillatough.com*
Grex Power Tools	**65**	*www.grextools.com*
Haiku Home	**11**	*www.haikuhome.com*
Harbor Freight Tools	**44, 45**	*www.harborfreight.com*
Hastings Saws	**73**	*www.hastingssaws.com/wj*
Howard Products, Inc.	**67**	*www.howardproducts.com*
Jantz Supply	**55, 59**	*www.knifemaking.com*
Kershaw	**51**	*www.kershawknives.com*
Knew Concepts	**59**	*www.knewconcepts.com*
The L.S. Starrett Company	**23**	*starrett.com/u?wood081815*
Lignomat	**71**	*www.lignomat.com*
		www.wood-moisture.com
MAX USA CORP	**17, 59**	*www.maxusacorp.com*
Mirka Abrasives, Inc.	**75**	*www.mirkawoodworking.us*
Next Wave Automation	**11**	*www.nextwaveautomation.com*
Osborne Wood Products, Inc.	**5**	*www.classicisland.com*
PanelPro	**63**	*www.panelpro.com*
Penn State Industries	**67**	*www.pennstateind.com*
Quickscrews International Corporation	**65**	*quickscrews.com/catalog/screw-kits*
Rikon Power Tools	**7, 73**	*www.rikontools.com*
Rockler Woodworking and Hardware	**63, 69**	*www.rockler.com*
SATA Spray Equipment	**61**	*www.satausa.com*
Sawblade.com	**3**	*www.sawblade.com*
SuperMax Tools	**55**	*www.supermaxtools.com*
Teknatool International Group	**17**	*www.teknatool.com*
Titebond	**13**	*titebond.com/QuickandThick*
Triton Precision Power Tools	**49**	*www.tritontools.com*
Varathane	**76**	*www.staining123.com*
Wagner Meters	**17**	*www.wagnermeters.com*
West Penn Hardwoods	**73**	*www.westpennhardwoods.com*
Woodworkers Source	**73**	*www.balticbirchply.com*
Work Sharp	**49**	*www.worksharptools.com*
ZAR	**23**	*www.ugl.com*

Perfect alignment just got easier

It's a tricky job getting applied drawer fronts perfectly positioned. They need to align with cabinet doors and other drawer fronts, and the gaps need to be consistent. Until now there wasn't a good way to fine-tune all these details and hold the front in place so you can secure it permanently. That's why Rockler designed these Drawer Front Installation Clamps ... one more way to help you *Create with Confidence.*

Rockler Drawer Front Installation Clamps
(54804) $39.99 pr.

EVERYDAY **FREE SHIPPING** On orders of $35 or more

Sign up for our emails and get every day FREE SHIPPING!
For details go to **rcklr.co/685** or call **1-800-279-4441**
and mention code 685 at checkout.

ROCKLER® WOODWORKING AND HARDWARE
Create with Confidence™

To shop, find a store or free catalog:
Rockler.com | 1-877-ROCKLER

Finishing Thoughts

Wonders of Watercolor Pencils

By Michael Dresdner

Blended tints and flowing hues with coloring book ease

Michael Dresdner is a nationally known finishing expert. He shares his expertise on the DVD *The Way to Woodwork: Step-by-Step to a Perfect Finish,* available through the store at *woodworkersjournal.com.*

Did you ever wish you could control stains or dyes so well that you would be able to paint a picture on wood, make faux inlays, or add blended and flowing color to a carving? Think about coloring a bas relief of a ripe pear or an autumn leaf with its purples, reds, yellows, oranges and greens flowing into one another. Or add fake inlays of rosewood, bird's-eye maple, spalted wood or even fake dovetails.

You could use paints and wood stains, but controlling them to get a natural look is difficult. Fortunately, there's a way to create the graceful blending of a fine watercolor painting with the ease of filling in a coloring book. The trick is a two-step process using watercolor pencils.

Left to right: Pencil work, starting to blend with water, final result.

What are Watercolor Pencils?

Watercolor pencils look and sharpen like any other colored art pencils, but they are water-soluble. Brush on water after coloring and the colors dissolve and flow into one another. They allow you to obtain the beauty of watercolor art with the ease of using a pencil.

Because the color goes on dry, it's very simple to put exactly what color you want exactly where you want it. Once the water is added, the individual pencil marks go away and blur, and you get a soft pool of color that mimics nature.

Why watercolor pencils in particular? Most regular colored pencils contain wax or oils, which means they are more difficult to blend, and might not be compatible under some finishes. Watercolor pencils do not contain waxes or oils, so they flow readily and are compatible under almost all

To start using watercolor pencils on wood, add some color lines, separate or overlapping.

Next, blend the pencil with water (as seen in the left side of this photo).

The end result of this process is solid, free-flowing, blended color.

finishes once they are dry. You'll find them at art supply stores. Good ones, which have softer, richer colored "lead," are rather expensive but worth it.

Step-by-step

Make sure your wood is smoothly sanded. For very dense woods, like hard maple, you can apply the pencil directly to the raw wood. Softer woods, like poplar, will grab the color and absorb more of it into the pores. To gain more control, seal softer woods first by flooding on some thin dewaxed shellac, then wiping it all off immediately. That will seal the wood enough so the pencil doesn't soak in too deeply, but it will still give you a surface that feels and works like raw wood.

You'll find that with lighter colors, such as yellows, oranges and even some reds, you'll need to color more intensely with the pencil than with darker greens, blues and browns. Use black only with caution, as it tends to muddy colors quickly.

Dipping the tip of the pencil in water will make it add more color, but may gum up the sharpener if you don't wait until the pencil is dry before sharpening the tip.

Continues on page 72 ...

Contact us

with your finishing questions by writing to Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340, or by emailing us at: *finishing@woodworkersjournal.com.* Please include your address, phone number and email address (if you have one) with your thoughts or questions.

Finishing Thoughts continued

You can print a clip art line drawing onto iron-on transfer paper, iron it directly onto the wood, and color it in.

Apply the colors any way you like, and overlap as much or as little as you choose, but once you start adding water it's a good idea to work from lightest colors to darkest. The brush will pick up and transfer some of the color, and it's easy to get your light areas too dark if you begin at the dark areas.

I like to use a small, well-formed brush, like a sable or watercolor brush rather than a big, soft oxhair mop. The fine end lets me blend as much or as little as I want by selectively putting more or less water in any given spot. Just flowing water over the whole thing leaves it a bit too much to chance. Try it on scrap and you'll see what I mean.

A Few Ideas

Carvings are a natural, but if you don't carve, simply start with an outline and color it in. Draw it yourself, find a nice laser cut pattern, or use an iron-on transfer.

A surprising array of colors blend to make the subtle hues of rosewood.

Add water carefully with a small touch-up brush to avoid obliterating the bird's-eyes on this type of maple.

For spalt, color and blend the background hues first, wait for the wood to dry, then add the dark lines.

Find a clip art line drawing online, resize it to fit your work, then print it onto iron-on transfer paper, which you can find at any office supply store. Lay it face-down on the wood, set an iron on the cotton setting, and press the image right onto the wood. Remember, the art will be a mirror image. If that matters, flip the image on your computer or printer before printing it onto the transfer paper.

One of the nice things you can do with pencils is create fake inlays of other woods right onto the wood itself. You'll want to mask so that your artwork appears only where you want it, for instance as a stringer or pattern inlay. In these samples, I simply let them blend to the wood so you could see clearly how they were done.

Rosewood, for instance, has a surprising array of colors in it that blend into a much more subtle figure. With bird's-eye maple, I was a bit more careful and dryer with the water so the bird's-eyes would soften but not get obliterated.

Spalted wood requires at least one extra step. First, apply your background colors to create the puddles of hue. Then blend those with water and let the wood dry before you apply the black lines. You can leave them as is, soften them with water, or only soften some areas where the line gets thicker or less distinct.

Don't be afraid to experiment. What you see here is just a jumping-off spot. There's no limit to what you can create.

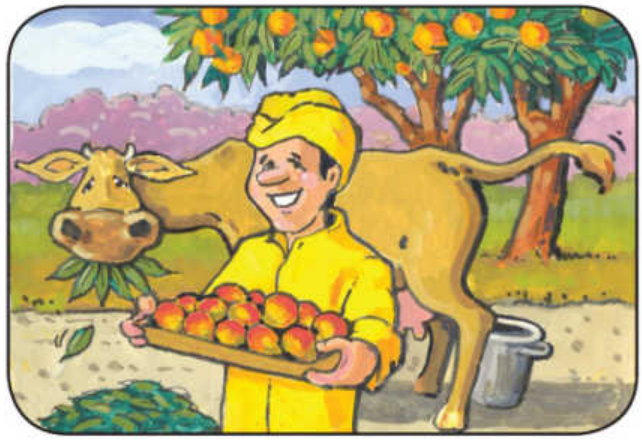
You can even add fake dovetails to a mitered box.

Topcoating

Once you are done with your artwork, seal it with shellac, varnish, Danish oil, lacquer or whatever you chose. Avoid water-based finish since a wet coat of it can flow the colors together more than you planned. If you must use water-based finish, seal the colored area first with dewaxed shellac.

HEY Did You Know?

Woodworking trivia: a colorful subject



The Straus Center for Conservation and Technical Studies at Harvard Art Museums houses over 2,500 pigment samples in tincture bottles, collected for art restoration. Among them is a rare ball of "Indian yellow," which is made from the urine of cows fed only on mango leaves.

What Does It All Mean?

A quick guide to terms from the world of woodworking.

Jig: An auxiliary device most often secured to a workpiece to guide it through a tool (or a tool through the workpiece), or to make multiple measurements in a consistent and repeatable fashion

Pith: The central core of a log or tree branch

Infeed: The side of a stationary tool from which the workpiece is fed into a cutter

Counterbore: An enlargement in the outer end of a hole for accepting a plug or nut and washer.

The ginkgo tree is unusual in that, unlike most trees, it was already around during the days of the dinosaurs.

Digital image courtesy of dionisvera/Bigstock.com

Digital image courtesy of JamesCade/Bigstock.com

In North America during the Ice Age, Native Americans used a carved wooden stick called an atlatl to throw a spear or dart long distances to hunt game like mammoths and woolly rhinos.

Photo courtesy of Derek J. Dickinson/Three Rivers Park District

An atlatl increases one's throwing distance by over double, and it allows for precise and accurate throwing.

Submit your own trivia ...

Send in a curious fact about your favorite topic and ours: woodworking. If it is selected for use, you will win an awesome prize!

Submit your Trivia to Woodworker's Journal, Dept. Trivia, 4365 Willow Drive, Medina, MN 55340. Or send us an email: *trivia@woodworkersjournal.com*

Your Trivia Test:

Q Atlatls are still used in modern sports competitions. How fast can a projectile thrown from an atlatl go?

Answer
Projectiles thrown from atlatls can reach speeds in excess of 93 miles per hour.

Kimberly Sutherland of Walla Walla, Washington, will receive a Hitachi 10" Compound Miter Saw (C10FCE2) for having her contribution selected for the Trivia page.

MIRKA

No one likes to work late.

VS

Mirka® DEROS and Abranet® | **Conventional Abrasives and Tools**

Mirka® DEROS is the first random orbital electric sander using advanced brushless DC motor technology, without the need for an external power transformer. When paired with Abranet®, no dust particle is more than 0.5mm from a dust extraction hole, eliminating the problem of dust clogging the abrasive.

Completing the dust-free perfection system with the Mirka MV-912 dust extractor, dust is no longer in the way and it's always possible to see exactly what is happening at the sanding surface, eliminating frustrating problems from over sanding.

The complete Mirka® Dust-Free System

Mirka® DEROS Sander

+

Abranet® Mesh Abrasives

+

Vacuum Hose

+

Dust Extractor

mirkawoodworking.us • mirkaderos.com

Mirka USA • 2375 Edison Blvd., Twinsburg, Ohio 44087 • tel 800-843-3904 • fax 800-626-6970

Thicker. Faster. Stronger.

Triple Thick Poly: 1 coat

Traditional Poly: 3 coats

Get the durable finish you expect, faster than you can imagine. With new Varathane Triple Thick Polyurethane. Just one coat of Triple Thick has the strength and thickness of three coats of traditional polyurethane. With an advanced self-leveling formula that's perfect for interior horizontal and vertical surfaces. Get the protection. Get the beauty. And save your valuable time. Varathane Triple Thick Polyurethane. The Ultimate Finish In One Coat. **Staining123.com**

Varathane

THE HOME DEPOT
More saving. More doing.